MARCH 9, 1935

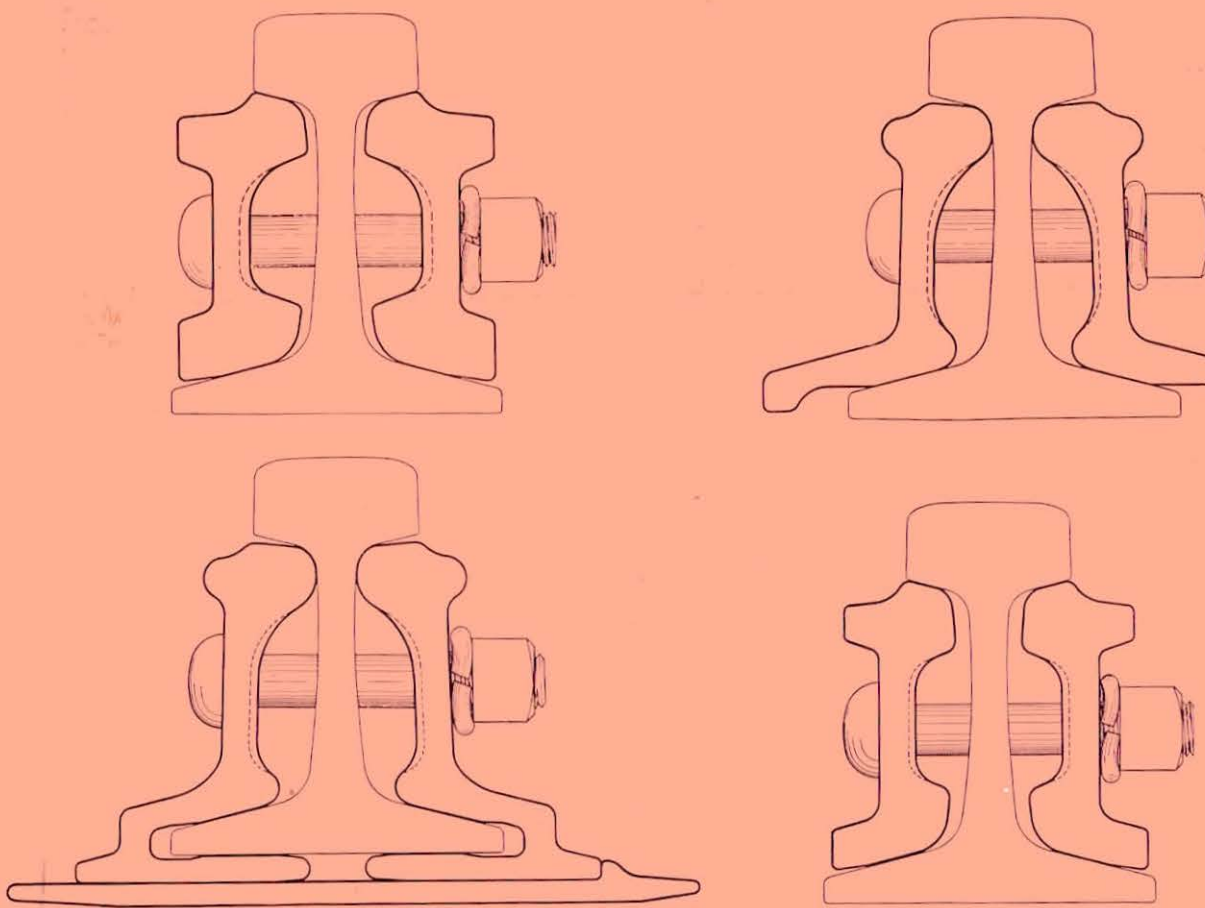
Railway Age

Founded In 1856

McCARTNEY LIBRARY
GENEVA COLLEGE

131 RE RAIL

JOINT SECTIONS TO MEET ALL REQUIREMENTS



Can be obtained in controlled bearing type

Immediate deliveries can be made of all these sections from existing rolls from mills convenient to your railroad.

WHY CONSIDER INFERIOR DESIGNS AT NO SAVING

The Rail Joint Company

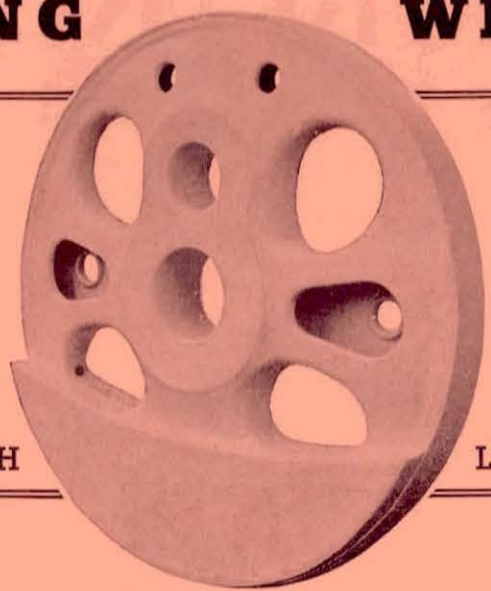
165 Broadway New York, N. Y.

America's Fastest Train

AND OTHER FINE TRAINS... *have Locomotives Equipped with*

BOXPOK

DRIVING WHEELS



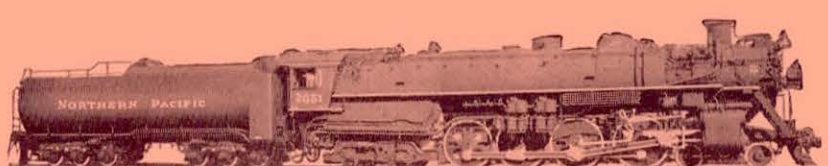
Stronger rim construction prevents out-of-round wheels and flat spots—increasing tire mileage.

Properly designed and counterbalanced to assure smooth operation of locomotive at high speeds.

GREATER STRENGTH LIGHTER IN WEIGHT

The "400"
Fastest Train in America

The George Washington



The North Coast Limited

GENERAL STEEL CASTINGS CORPORATION

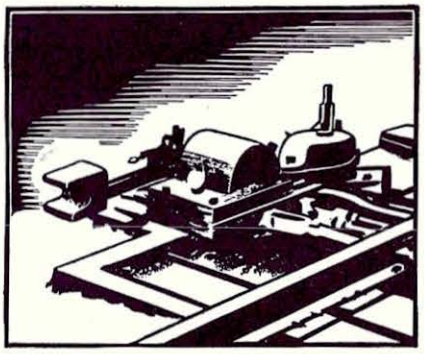
COMMONWEALTH PRODUCTS

EDDYSTONE, PA. GRANITE CITY, ILL.

Published weekly by Simmons-Boardman Publishing Company, 1309 Noble Street, Philadelphia, Pa. Entered as second class matter, January 4, 1933, at the Post Office at Philadelphia, Pa., under the Act of March 3, 1879.

Added Safety for High-Speed Trains

POSITIVE DISTANT-SIGNAL WARNING OF LURKING DANGER AT SWITCHES



THE NEW Five-Point Safety Switch Control, known as the Bethlehem Positive Signal Stand, maintains a continuous check on switch points and gives instantaneous distant-signal warning of any dangerous condition. This device, besides fulfilling the usual functions of a switch stand, throws a derail in a turnout, operates a distant-signal indication and also embodies a two-rod facing-point lock and detector-bar protection for the switch points.

No possible cause of trouble at a switch is overlooked by this Bethlehem development. Any switch in track-circuit territory, however remote, can be completely safeguarded. Warning is given even of conditions of such a nature that the target indication would be clear—for example, in cases where a switch has been run through, leaving the points open without changing the target position. The Bethlehem Positive Signal Stand reports on conditions right at the points. Any derangement leaving them open more than ⅛-inch is instantly revealed.

The Bethlehem Positive Signal Stand provides the opportunity to raise safety standards another notch. The steadily increasing speed of all classes of traffic makes this additional safety highly desirable.

The design of the Bethlehem Positive Signal Stand provides the three features most desirable in such an important signal device:

1—Ease of installation

2—Facility of adjustment

3—Ready accessibility for inspection and maintenance.

Write for booklet giving complete detailed information on this new development.

★ FIVE POINTS OF SAFETY

1 Danger is indicated the instant the switch-stand lever is lifted.

2 The siding derail is maintained open or closed relative to the main line switch position.

3 Switch points are double-locked, by two rods, for main line movement. Obstructions between the point and stock rail are instantly detected, as the throwing lever cannot be locked until the retarding object is removed and the point is in contact with the stock rail.

4 Danger is indicated at a distant signal whenever points are more than ⅛-inch from through-movement position. Signal remains "red" until the points are returned and locked for main track operation.

5 When the switch is run through the detector bar is actuated, closing the electric circuit and automatically indicating danger at the distant signal. The "red" signal will remain until the damage is repaired and the points restored to the normal position.

PLAN TO ATTEND THE

A.R.E.A. CONVENTION

AT CHICAGO, MARCH 11, 12, 13, 14

A standard switch equipped with the Bethlehem Positive Signal Stand will be on exhibition.

★ ★ ★

District Offices: Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Houston, Indianapolis, Kansas City, Milwaukee, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul, Washington, Wilkes-Barre, York. *Pacific Coast Distributor:* Pacific Coast Steel Corporation, San Francisco, Seattle, Los Angeles, Portland, Honolulu. *Export Distributor:* Bethlehem Steel Export Corporation, New York.

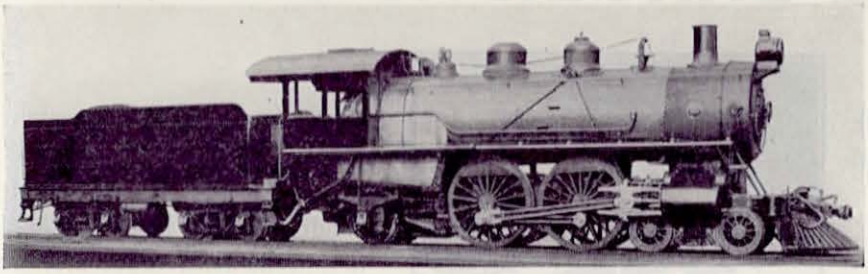
BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

GENERAL OFFICES: BETHLEHEM, PA.

WHICH WILL SERVE BEST

to lower costs and increase profits ?

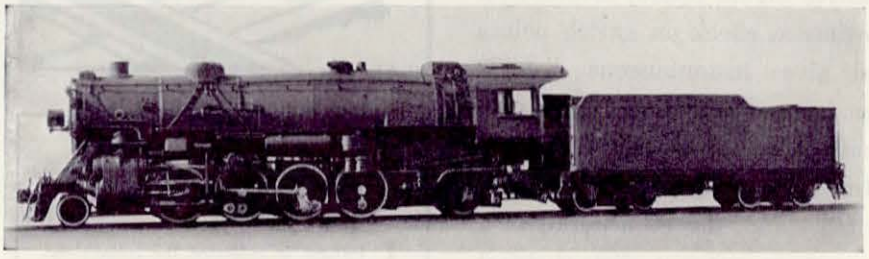


BUILT 1906

Now obsolete because of physical age, low steam pressure, and no superheat

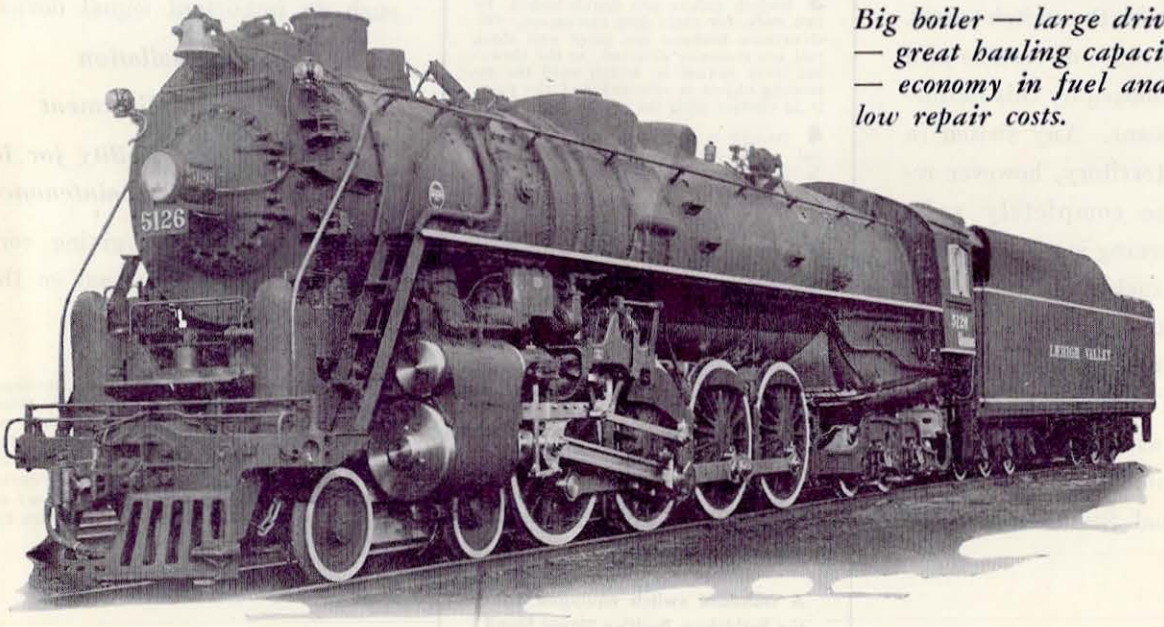
BUILT 1929

Already obsolete because the small drivers are inadequate for modern high-speed service.



1934

Big boiler — large driving wheels — great hauling capacity at speed — economy in fuel and water — low repair costs.



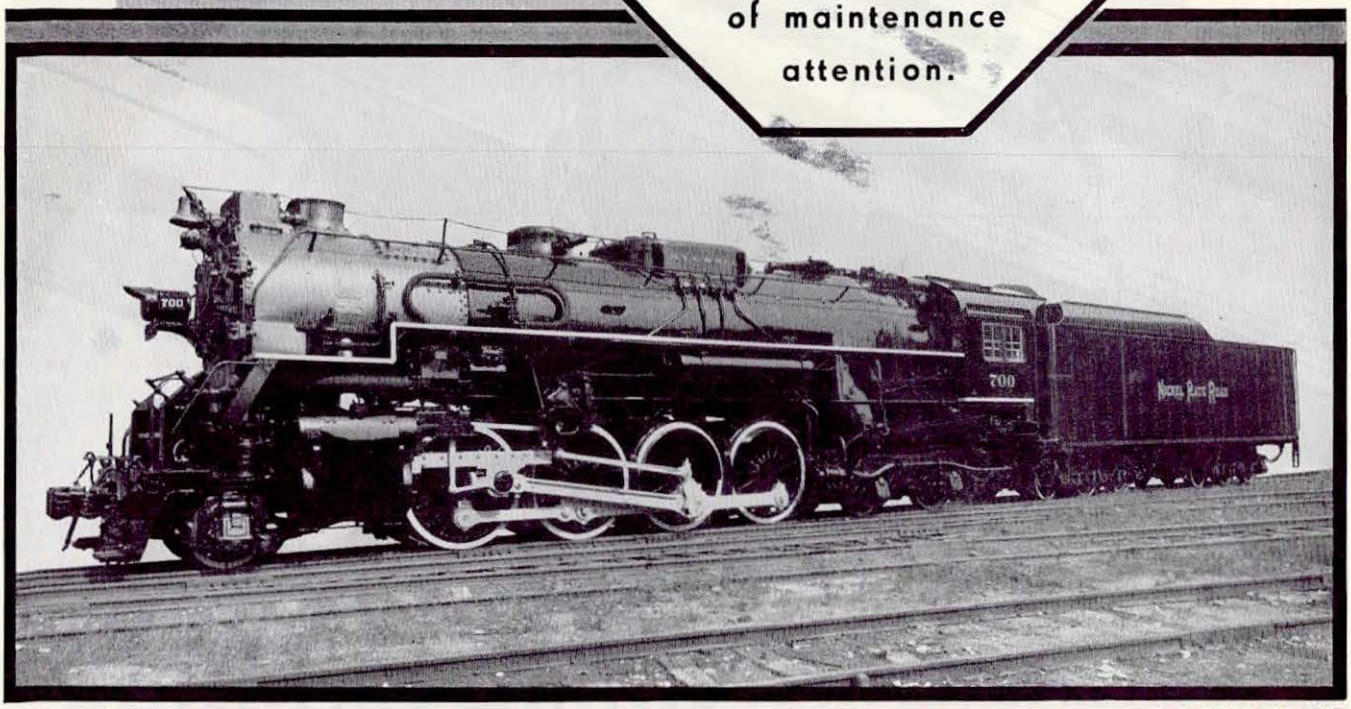
It takes Modern Locomotives to make money these days!

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA

SIMPLEX CLASP BRAKES AND DAVIS STEEL WHEELS

used on the tenders of the new Nickel Plate power, contribute to their dependability and efficiency, and increase availability with a minimum of maintenance attention.

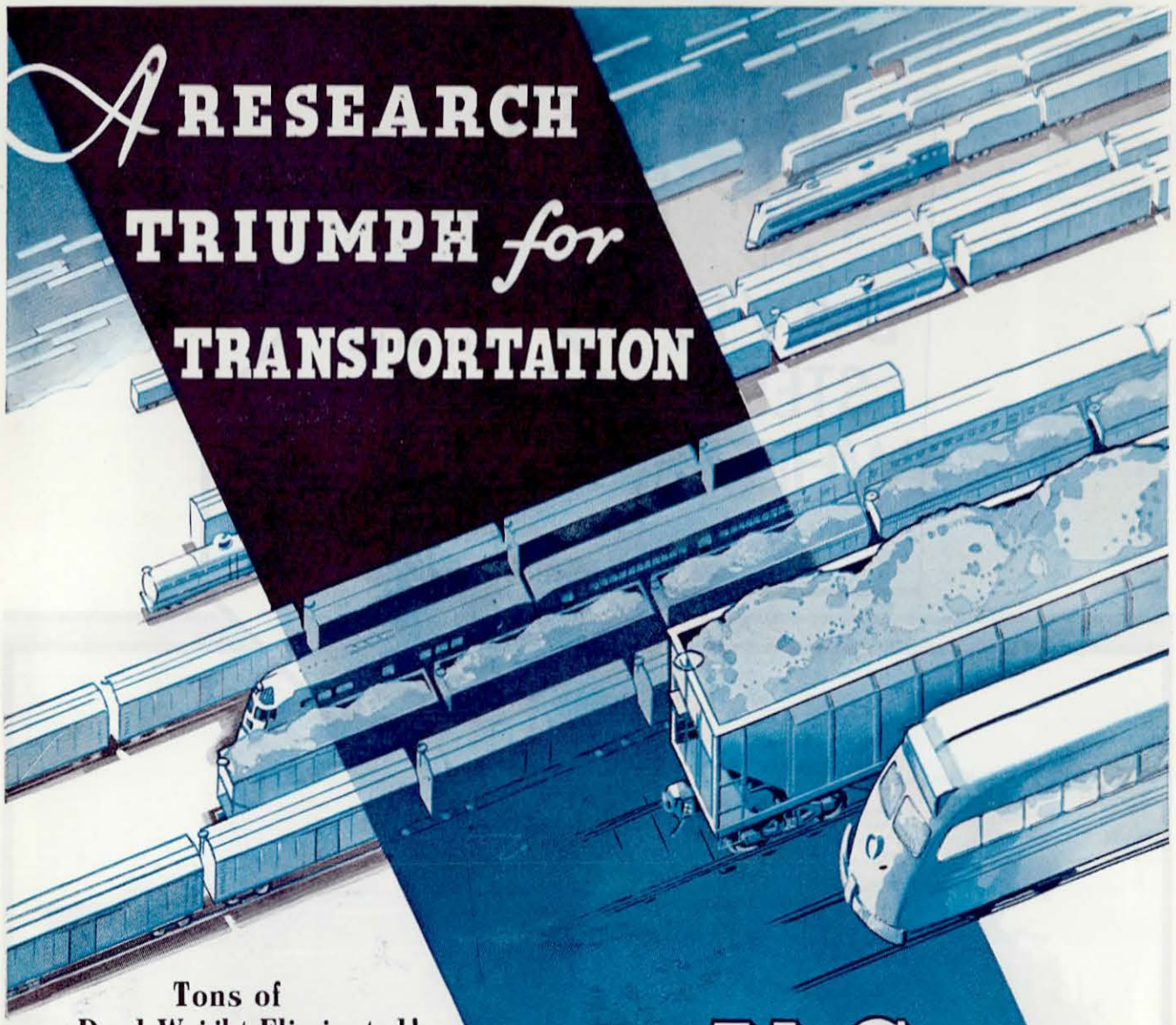


These locomotives in working order have a total weight of 774,000 pounds and of this amount 358,000 pounds represents the weight of the tender, which has a capacity of 22 tons of coal and 22,000 gallons of water.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

A RESEARCH TRIUMPH for TRANSPORTATION



Tons of Dead Weight Eliminated!

Greater pay-load capacity provided! U S S research has made this practicable through a series of high-strength alloys in which the leading grades are corrosion-resistant U S S COR-TEN, and U S S 18-8 Stainless Steel. Available in the same forms as mild steel, U S S High Tensile Steels have progressively higher physical properties.

The atmospheric corrosion resistance of U S S COR-TEN is based upon ACTUAL TESTS extending over a period of years in several different atmospheres. Our statements are based on this actual experience, not upon accelerated or laboratory tests.

USS HIGH-TENSILE STEELS

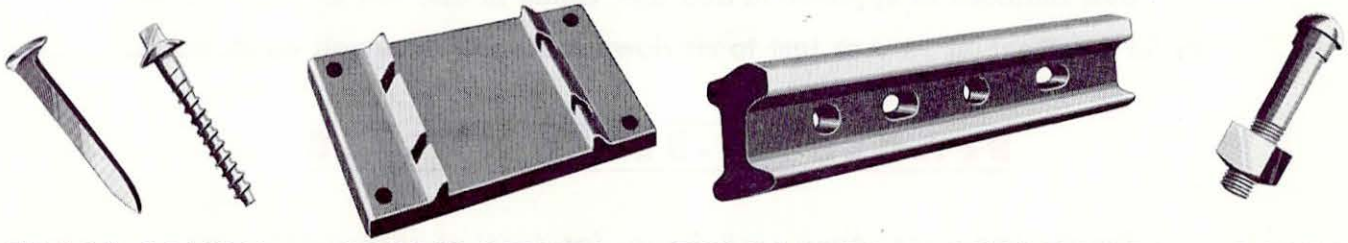
U S S High Tensile Steels are supplied in shapes, plates, bars, strip, sheets, rods, wire and wire products, pipe and tubular products. Write for information and literature. Address following manufacturing companies:

AMERICAN SHEET AND TIN PLATE COMPANY, *Pittsburgh* TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*
AMERICAN STEEL & WIRE COMPANY, *Chicago* COLUMBIA STEEL COMPANY, *San Francisco*
CARNEGIE STEEL COMPANY, *Pittsburgh* ILLINOIS STEEL COMPANY, *Chicago* NATIONAL TUBE COMPANY, *Pittsburgh*

Pacific Coast Distributors—COLUMBIA STEEL COMPANY, San Francisco, Calif. *Export Distributors*—UNITED STATES STEEL PRODUCTS CO., New York, N.Y.

United States Steel Corporation Subsidiaries

Don't misunderstand us: we're not trying to claim that Illinois Track Materials will solve all your problems. But they'll help keep tracks smooth and even. Because their quality and their uniformity can be relied on.



TRACK SPIKES • SCREW SPIKES • TIE PLATES • ANGLE BARS • BOLTS

See you at the NRAA show Spaces 41-51 and 60-69

ILLINOIS
TRACK MATERIALS

ILLINOIS STEEL COMPANY
208 SOUTH LASALLE STREET, CHICAGO, ILLINOIS

United States Steel Corporation Subsidiary

STEEL ON *Display*

A WARM WELCOME awaits every railroad man at our exhibit to be seen at the N. R. A. A. exposition in Chicago. And with that welcome a chance to study at first hand many of steel's most notable contributions to modern railroading. New steels . . . new product designs . . . new methods of application and use. Come in and see them . . . come in for information . . . or just to sit down and make yourself comfortable.

SPACES 41-50 and 60-69

See Railway Age, April 13th issue, for further information on

"STEEL FOR EVERY RAILROAD NEED"

United States Steel Corporation Subsidiaries

AMERICAN BRIDGE COMPANY
AMERICAN SHEET & TIN PLATE COMPANY
AMERICAN STEEL & WIRE COMPANY
CARNEGIE STEEL COMPANY
COLUMBIA STEEL COMPANY
CYCLONE FENCE COMPANY
ILLINOIS STEEL COMPANY
NATIONAL TUBE COMPANY
SCULLY STEEL PRODUCTS COMPANY
TENNESSEE COAL, IRON & R. R. COMPANY
THE LORAIN STEEL COMPANY
UNIVERSAL ATLAS CEMENT COMPANY

Published every Saturday by the Simmons-Boardman Publishing Company, 1309 Noble Street, Philadelphia, Pa., with editorial and executive offices: 30 Church Street, New York, N. Y., and 105 West Adams Street, Chicago, Ill.

SAMUEL O. DUNN, *Chairman of Board*
HENRY LEE, *President*
LUCIUS B. SHERMAN, *Vice-Pres.*
CECIL R. MILLS, *Vice-Pres.*
ROY V. WRIGHT, *Vice-Pres. and Sec.*
FREDERICK H. THOMPSON, *Vice-Pres.*
GEORGE SLATE, *Vice-Pres.*
ELMER T. HOWSON, *Vice-Pres.*
F. C. KOCH, *Vice-Pres.*
JOHN T. DEMOTT, *Treas.*

CLEVELAND
Terminal Tower

WASHINGTON
832 National Press Building

SAN FRANCISCO
55 New Montgomery St.

Editorial Staff
SAMUEL O. DUNN, *Editor*
ROY V. WRIGHT, *Managing Editor*
ELMER T. HOWSON, *Western Editor*
H. F. LANE, *Washington Editor*

B. B. ADAMS
C. B. PECK
W. S. LACHER
ALFRED G. OEHLER
F. W. KRAEGER
E. L. WOODWARD
J. G. LYNE
J. H. DUNN
D. A. STEEL
R. A. DOSTER
H. C. WILCOX
NEAL D. HOWARD
CHARLES LAYNG
GEORGE E. BOYD
WALTER J. TAFT
M. H. DICK

The Railway Age is a member of the Associated Business Papers (A. B. P.) and of the Audit Bureau of Circulations (A. B. C.).

Subscriptions, including 52 regular weekly issues, payable in advance and postage free: United States and possessions, 1 year $6.00, 2 years $10.00; Canada, including duty, 1 year $8.00, 2 years $14.00; foreign countries, 1 year $8.00, 2 years $14.00.

Single copies, 25 cents each.

Railway Age

With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name registered U. S. Patent Office

Vol. 98 March 9, 1935 No. 10

In This Issue

More Money for Grade Separation ..... Page 352

Tells how popularity and success of program for federal financing of grade separation point to prospects for additional appropriation.

Federal Funds for Highway Crossing Protection 356

A survey which reveals that twenty states now have programs involving more than 1,223 crossings, and that others are proposed.

P. & W. V. Articulated Locomotive Replaces Two Consolidations .. 361

A description of this Baldwin, single-expansion 2-6-6-4 type which has a starting tractive force of 113,500 lb.

EDITORIALS

Government Ineptitude in Dealing with Transportation 349
Locomotives, Cars, and Public Relations 350

GENERAL ARTICLES

More Money for Grade Separation 352
Federal Funds for Highway Crossing Protection 356
Grade Separations Benefit Road Users Primarily 358
C. G. W. to Be Reorganized 360
P. & W. V. Articulated Locomotive Replaces Two Consolidations 361
Freight Car Loading 362
Comments on the Development of the U. P. Streamline Train, by A. H. Fetters 363
Roper Sees Progress Toward Transportation Co-ordination 365
Pelley Finds Co-ordinator No Longer Needed 366

ODDS AND ENDS 367

NEWS 368

NET INCOME—CLASS I RAILWAYS 375

REVENUES AND EXPENSES OF RAILWAYS 377

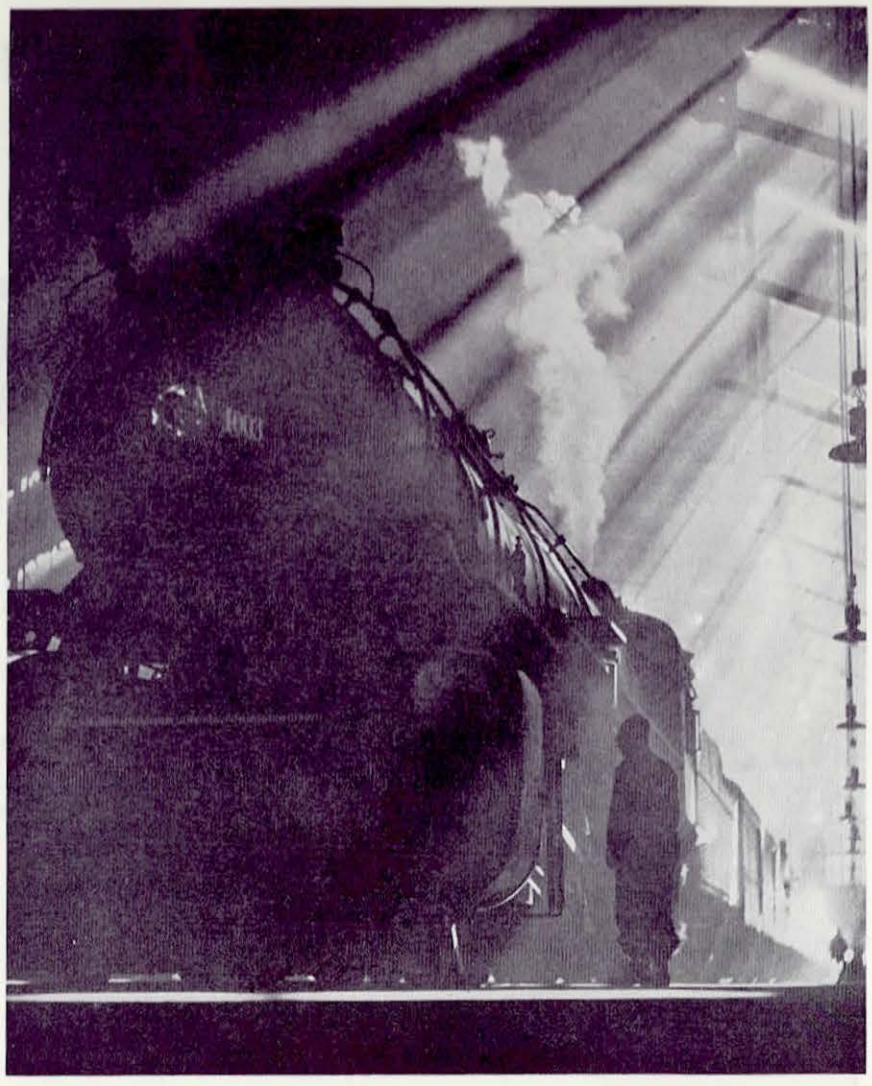
FREIGHT OPERATING STATISTICS 381

The Railway Age is indexed by the Industrial Arts Index and also by the Engineering Index Service

MORE POWER MEANS

HIGHER STRESSES

BETTER MATERIALS ARE NEEDED TO KEEP MAINTENANCE IN CHECK

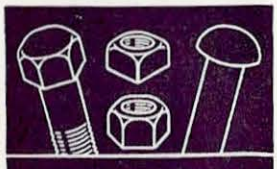


Freight trains at passenger speeds are crowding the old materials beyond their limits. Maintenance is rising as speed and loadings increase.

To meet the increased stresses imposed by modern railroading, Republic has developed many alloy steels and irons with improved properties that will give longer service life.

An alloy steel gives new toughness to axles and protects against failures due to shocks at low temperature; side sheets of Toncan Iron resist corrosion and fire-cracking; alloy staybolts offer increased toughness and corrosion resistance—and so on thru all the uses of steel in railroad equipment.

For each, Republic has a maintenance-reducing material that will help lower the major item of operating expense. Bring your materials problem to Republic.



REPUBLIC BOLTS NUTS and RIVETS and similar staples are made with the same care and high quality of material as are the familiar Republic railroad specialties.

Republic Steel
CORPORATION
CENTRAL ALLOY DIVISION, MASSILLON, OHIO
GENERAL OFFICES: YOUNGSTOWN, OHIO

Government Ineptitude in Dealing with Transportation

During the past year Co-ordinator Eastman, with the aid of his staff, has offered several plans whereby —in his opinion—railroad service may be improved. These plans—among them those on the pooling of l.c.l. traffic, the pooling of freight cars and the merchandising of passenger service—are being studied by the railroads, without a final opinion on any of them as yet being agreed upon. Meantime, no little impatience is developing in some quarters at the slowness of the railroads to take action on these plans—particularly upon those which deal with the pooling of freight cars and the consolidation of l.c.l. traffic.

Eastman's Recommendations to Congress Are Now a Year Old

Those who feel such impatience, however, should recall that Mr. Eastman has issued reports not only on matters dealing with railroad operation, but also that he reported to Congress on transportation legislation required in the public interest almost exactly a year ago. Furthermore, the enactment of his proposed bills for the regulation of highway and water carriers was unanimously urged at that time as "imperatively necessary" by the Interstate Commerce Commission. The modification of the fourth section of the Interstate Commerce Act which he recommended was agreed to by all but two members of the Interstate Commerce Commission. And yet none of these measures has yet become a law.

Extensive hearings were held on motor carrier legislation at the last session of Congress, and the question has been before that body for years. Meantime, as the result of ceaseless study and discussion for the past decade, general enlightenment on this problem is perhaps more thorough than it is on any great public question. The development of understanding of the nature of the competition in transportation has decimated the ranks of the opponents of regulation of highway carriers until those that remain are the merest handful of myopic bitter-enders. Not a single competent and social-minded student of transportation problems remains with them. The bus and truck operators themselves favor the regulation of their business, in principle at least.

If there were needed a further example of the incompetence of government to deal realistically and intelligently with economic problems, the lassitude of Congress and its easy unconcern about "imperatively necessary" transportation legislation would provide it. This observation implies no personal criticism of Congressmen. The members of the National Legislature are concerned mainly with being re-elected. Unless they can be shown that there are more votes involved in this question than there are in the public works appropriations or the so-called "social security" measures, then, unless they are men of an extraordinary spirit of self-sacrifice, they will naturally be concerned more with measures in which they believe votes are involved. After all, the man who wants to keep his job usually pays more attention to the wishes and whims of his boss than he does to those of any outsider, however well-informed the latter may be. And the boss of the Congressmen and Senators is the voters who go to the polls on election day.

Union's Demand for Equal Regulation Is Lacking in Vigor

The problems of the transportation industry are involved inextricably in political action, and the political part of their solution has stagnated because the transportation industry—at least the railroad part of it—has little recognized voting strength. True, there are millions of citizens whose livelihood is dependent upon restoring order in the transportation industry. But most of them are not organized in such a way as to give voice to their desires. The largest and most powerful cohesive group among them—the railway labor organizations—which could offer voting strength of sufficient validity and strength to arouse the attention of legislators, has unfortunately chosen not to do so. The labor organizations, it is true, do favor the equalization of regulation in transportation, but it is a minor part of their legislative program. They do not demand it as if they really cared whether they got it or not. The main part of their program—the "full" crew bill, the short train bill and the six-hour day—is calculated to wreck the industry which supports them, rather than to save it.

The *Railway Age* is hopeful, despite the slow progress of the "imperatively necessary" legislation needed by the transportation industry, that some of it at least may be enacted at the present session of

Congress. If the railway labor organizations, as such, fail to profit by the opportunity afforded them to perform a job of constructive statesmanship in behalf of the transportation industry, then their members, either as individuals or through their affiliation with other organizations, can still bring the legislators to a realization that they have political power and intend to use it. Perhaps some more than ordinarily astute politicians may realize that the progressive disintegration of the forces opposed to equality of regulation in transportation evidences the development of a positive body of opinion demanding such regulation—even before it has become vocal in proportion to its numerical strength. Perhaps the Administration may feel that the time has come, at long last, to make good its promise and come to the support of this legislation with sincere vigor. At any rate, concerned as we are with the welfare of the transportation industry (and not merely the immediately selfish interest of a part of it), we hope that any or all of these developments may come to pass so that at least a beginning may be made in rationalizing and co-ordinating our national transportation system; and that every branch of it may be placed on a sound and profitable basis in the public interest.

Free Competition in Transportation Inevitably Chaotic

However that may be, the unconscionable delay and lack of realism of the government's dealing with questions of transportation policy ought to be conclusive evidence of its incompetence to deal with the industry effectively in a managerial capacity. The umpire who cannot even render reasonably prompt and intelligent decisions on disputed points is a mighty poor candidate to take the place of all eighteen players in the game. The "joint-cost" nature of transportation service makes it improbable that it can ever be conducted successfully over a very long period under free competition; some governmental intrusion is, therefore, inevitable. But the limitations of government authority should be plainly recognized; and the principal one of these is the rareness with which it is able to arrive at a reasonable decision based upon the facts and the public interest involved, rather than upon voting strength and how well it is organized.

When decisions on economic questions are made on a basis of true efficiency, the national income is increased and every member of society is to some degree enriched thereby. When such decisions are made contrary to sound economy and in the interest of votes, the national income is decreased and every member of the society which divides that income is correspondingly impoverished. An industrial system making all its decisions with its eye on the polls, and contrary to sound economy, would not produce a national income worth anybody's fighting for. And what is true of our industrial system as a whole is certainly equally true of the important part of it which the transportation industry constitutes.

The time the railroads have taken to weigh and discuss Mr. Eastman's proposals for improving the internal economy of railroad transportation need elicit no criticism, when compared to that taken by Congress to weigh and consider his recommendations about matters much better understood because of prior discussion and study. This is not by any means meant to express disagreement with the suggestions Mr. Eastman has made to the railroads, some of which, we are convinced, can be acted upon with profit all around; and all of which deserve careful and critical consideration. But we are told that government operation of the railroads is the alternative to their successful operation by private managements.

Government a Chronic Dawdler

While private management is perhaps not quite as rapid in ushering in the millennium as its critics who are not faced with its practical difficulties could desire, what are we to conclude about the efficiency of government which has had similar—but simpler—specific recommendations before it for a much longer time? The logic of the advocates of government ownership would cause them to call in a blacksmith to repair a watch if, by reason of the exacting nature of the task, the watchmaker could not finish it in a few split seconds. Which is not to say that the watchmaker should not pursue his job with the utmost diligence and skill as long as he is permitted to do so. Perhaps thereby the blacksmith may not be called in, after all.

Locomotives, Cars and Public Relations

Are not many railroads, and possibly all of them in a large degree, overlooking a good bet in not taking advantage of the keen interest of a considerable and enthusiastic group of railroad "fans," and the dormant interest of a much larger number which could readily be stimulated by more showmanship on the part of the railroads in exhibiting their equipment? Some evidence of this interest is indicated by the experience of those roads which have introduced high-speed streamlined passenger trains; literally millions of people have eagerly sought the opportunity of inspecting these trains when they were placed on exhibit, or of seeing them operate as they passed through the country. One riding on trial trips of these trains cannot but be impressed by the large groups of school children, and of older folks as well, gathered at the stations or lined up on the hillsides or points of vantage. This, however, is only one of the many indications of a pronounced interest on the part of the public in the railroad equipment and its operation.

To a railroad man there is nothing very exciting or stimulating about a steel hopper car, and yet those in

charge of such a car of new design were amazed recently at the interest shown by the general public at places where it was exhibited. Thousands took advantage of the opportunity to examine several pieces of equipment recently shown by the Lackawanna at its principal stations, consisting of a new steam locomotive, a 50-ton hopper car and a rebuilt box car. The Pennsylvania had equally good results in displaying its new streamlined electric locomotive at stations between New York and Washington.

A fact that must not be overlooked, however, is that while crowds turn out to see this more or less novel equipment, much the same interest will be shown in ordinary cars and locomotives if opportunity is afforded. This was demonstrated by Superintendent of Motive Power C. M. Darden, of the Nashville, Chattanooga & St. Louis, last fall, when he made an offer to have groups of school children or of such organizations as the Boy Scouts, shown through the repair shops at Nashville, Tenn., when accompanied by their teachers or leaders, appointments of course to be made in advance. Many groups have taken advantage of this offer. Think of the influence this may have upon the community, as the children carry the story of their experiences back into the home or discuss them in the school sessions. Will they not be keen to take advantage of the very first opportunity to ride on one of the trains?

Vice-President George Le Boutillier of the Pennsylvania, was concerned by the fact that great numbers of children have never had a ride on a railroad train. With the co-operation of the school authorities in one of the communities served by his road, he arranged to give the children a short ride on a train and to have them shown through one of the large stations. A similar plan on a large scale has been tried out by the railroads and the school authorities in Cincinnati. Will this not tend to cultivate a real and intelligent interest on the part of the children, and that of their parents also, in the welfare of the railroads? At the very least, will it not cause them to be more open-minded in drawing conclusions on important problems affecting the railroads?

Railroad clubs will be found in many high schools—not at all inspired by railroad men—and railroad equipment and operation seem to have a peculiar attraction for some troops of Boy Scouts. The Baltimore & Ohio recently made it possible for a Boy Scout troop to visit one of its engine terminals, to meet and talk with a real live locomotive engineer, and to climb over and examine his locomotive. What boosters they have become for the railroad, and how they treasure a photograph which was taken and which was published in one of the magazines! Unfortunately many of these clubs and organizations have difficulty in contacting with the railroads and securing permission to visit the terminals and yards and examine the equipment. Ought not the railroads to be diligently on the alert for opportunities to encourage such groups? In the long run will it not mean much in improving relations with the public and also in securing traffic?

There is another considerable group of men who have never worked on a railroad, but who have made it a hobby to study railroad operation or equipment. Some of these collect drawings or photographs of locomotives or cars, or other equipment; others specialize on the collection of books dealing with various phases of railroad history, operation, or other matters. These men, and they will be found in the most unusual places, know and understand thoroughly the particular phases of railroad lore upon which they have specialized. Among them are professional men, business men, clerks and mechanics. Little attention has been paid to them by railroad officers. It is reported that one of these "fans" tried to buy a piece of old railroad equipment which was obsolete; an executive opposed selling it to him because he was not a railroader and ought not to be encouraged to make such a collection.

Then there is another group which has been enlarging by leaps and bounds in recent years. These are the model makers and more than anything else they seem to have concentrated their attention on locomotives. The last edition of the Locomotive Cyclopedia seemed ample for ordinary purposes, but used copies are now being sold at a premium because of the demands of the model makers. Many of these boys and men class themselves as railroaders and will fight for the railroads to the last ditch.

Cannot the railroads capitalize on these various points of interest by deliberately and actively planning to capture the attention and enthusiasm of individuals and groups by co-operating with them in their effort to learn about the details of railroad operation and the details of the equipment? In a large way this has been done on numerous occasions by unusual showmanship, such for instance as the Baltimore & Ohio centenary with its imposing "Fair of the Iron Horse" at Halethorpe, Md., or by the more recent pageant "Wings of a Century," at the Century of Progress Exposition at Chicago, regarded by many as the outstanding feature of the exposition. The New York, New Haven & Hartford "Progress Special," also attracted widespread attention because of the clever way in which it illustrated the remarkable progress in the development of railroad equipment since the early days. This train, exhibited at the principal stations on that road, included an early wooden car with open platform and gas lights, with several other cars illustrating forward steps in design, culminating in one of the new streamlined passenger coaches.

Along with such examples of showmanship, however, should go a consistent effort to search out those groups interested in specific phases of railroad operation and extending to them reasonable courtesies in the knowledge that it will make them more railroad-minded and boosters for the railroads.

Millions of Dollars Have Been Spent by the Railways in Elevating Their Tracks Through Cities

More Money for Grade Separation

Popularity and success of program for federal financing of grade separation point to prospects for additional appropriation

WHILE the legislative program of the seventy-fourth congress embodies a number of measures that promise to exert a profound influence on the future of rail transportation, railway engineers have a primary interest in the prospect for legislation that will foster an expanded program for the separation or protection of highway grade crossings. The administration has been reticent concerning the details of the President's vast program for public works, to be carried out under the blanket provisions of the unemployment relief bill, but grade separation has been specifically mentioned as a type of project that possesses merit and should receive prior consideration in the allocation of federal funds.

However, the prospects for federal appropriations for grade crossing elimination and protection are by no means dependent on the fate of the President's unemployment relief plan, concerning which grave doubts have been raised in recent weeks by reason of the increasing strength of insurgent groups in Congress. Even if the bill should go by default or survive in an emasculated form, there are good reasons for believing that provision will be made in some form for a sizable program of grade separation, with contingent provision for grade crossing protection as well, and under a breakdown agreed to by the President on March 5 in a conference with Senator Carter Glass, Chairman of the Senate Appropriations Committee, $800,000,000 would be allocated to "highways and grade crossings."

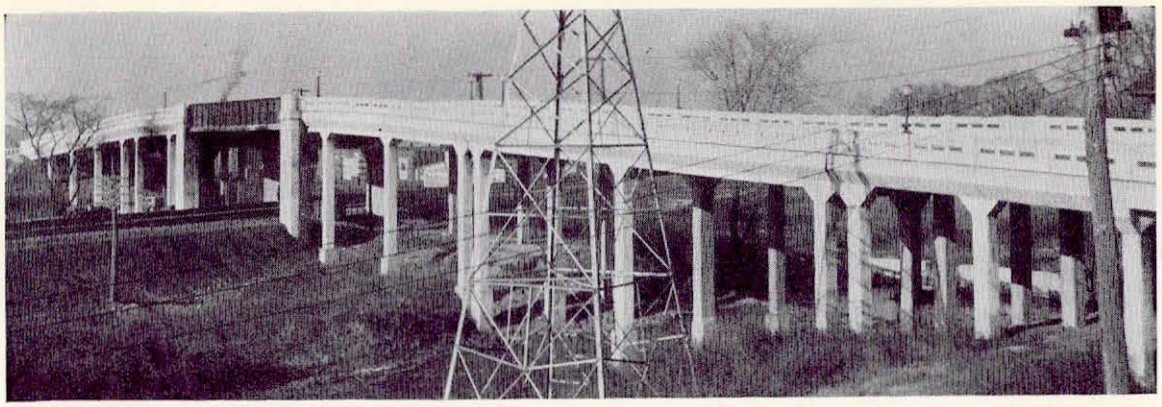
Authorized in Recovery Act

Foremost among these is the precedent established by the provisions of Title II of the National Industrial Recovery Act of June, 1933, under which expenditures for the "elimination of hazards to highway traffic" were specifically authorized from an appropriation of "not less than $400,000,000" to be expended under the terms of the Federal Highway Act of 1921. Similar provisions were incorporated in the Hayden-Cartwright Act of June, 1934, under which an additional $200,000,000 was appropriated for the same purposes.

This plan for allotting federal money for grade separation has proved popular. A large number of separations and a considerable program of protection were undertaken under the terms of the earlier law, and plans have been prepared for an extension of the program under the provisions of the second law, the funds for which have just been apportioned to the states. For these reasons, it is anticipated that if the administration's bill fails, favorable action will be taken on a bill to be introduced by congressman Cartwright, following the lines of the earlier legislation, but making specific rather than incidental provision for a continued attack on the grade crossing problem.

That the results obtained along this line under the auspices of the National Recovery and Hayden-Cartwright acts have been looked on with favor by the Administration was evidenced, also, in the plan for emergency unemployment relief proposed last October, under which Thomas H. McDonald, chief of the Bureau of Public Roads, was asked to canvass the state highway commissions for lists of grade separation projects that could be started in 30, 60 and 90 days, respectively. While this project did not get beyond the speculative stage, the data made available have been of material value in studies pursuant to a continuation of this work.

Of equally favorable portent is the widespread public interest in grade separation, the expressed advocacy of it by a number of quasi-public bodies and the general spirit of co-operation that has been manifested in negotiations between railway and public highway officers, both state and federal, for the furthering of projects made possible by previous legislation, as well as for the development of preliminary plans for separations that could be carried out if additional funds were made available. It is significant also that Harold L. Ickes, public works administrator in a statement released on November 15, made specific reference to grade separation as



Continuation of the Program of Grade Separation Will Necessarily Entail the Inclusion of More Costly Projects, Like the Overcrossing Shown at the Left

one of several measures that possessed special merit as agencies for unemployment relief. The position taken by Co-ordinator Joseph B. Eastman was clearly stated in a letter to Secretary Ickes written in August, 1933, concerning the allocation of federal funds for public works in which he said:

"Money spent in elimination of the most dangerous grade crossings would be money exceedingly well spent from the standpoint of public safety.

"Grade crossing elimination has been a most painful thorn in the flesh of the railroads. The conditions which impel such elimination with continually increasing force have been created, not by the railroads, but by their competitors, the motor vehicles. From a railroad standpoint, moreover, the heavy capital expenditures involved in such elimination fall far short of paying their way.

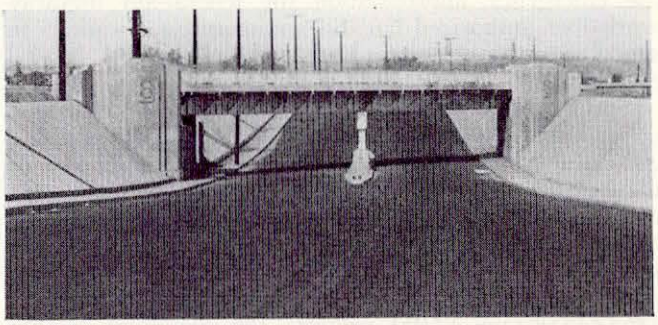
"My belief is strong that use of the public works fund in the eliminatien of railroad grade crossings would be most beneficial to the railroads and to the country as a whole, having in mind not only public safety, but railroad traffic and employment and other employment as well."

This evolution in the attitude of the public regarding grade separation is a recent development. For many years the railroads fought with little success against the injustice of contractural agreements covering grade separation projects, that compelled them to assume all or nearly all of the expense involved. In fact, it was only as the streets and highways became utilities for the conduct of transportation in direct competition with the railways, that the latter began to enjoy any real success in demonstrating the injustice of requiring them to carry most of the burden of a type of improvement that was primarily of benefit to the competing carriers and the public at large.

But the idea gained ground slowly, the public manifested extreme reluctance to assume any appreciable share of the expense, and it was only because of a realization of the inability of the railroads to finance work of this kind on a scale that was demanded by the users of the highways that the states and municipalities were prevailed on to share measurably in the cost. Later, as the agitation for grade separation took the form of nation-wide campaigns, legislatures in some states were impelled to offer increasingly favorable terms as a means of enabling the railroads to participate in more projects. But even the most favorable apportionments proposed failed to meet the ends of justice because they imposed on the roads enormous outlays for improvements from which they would gain little direct benefit.

Supreme Court Decision

Up to the present time, this change in the status of the railroads with respect to the grade separation pro-

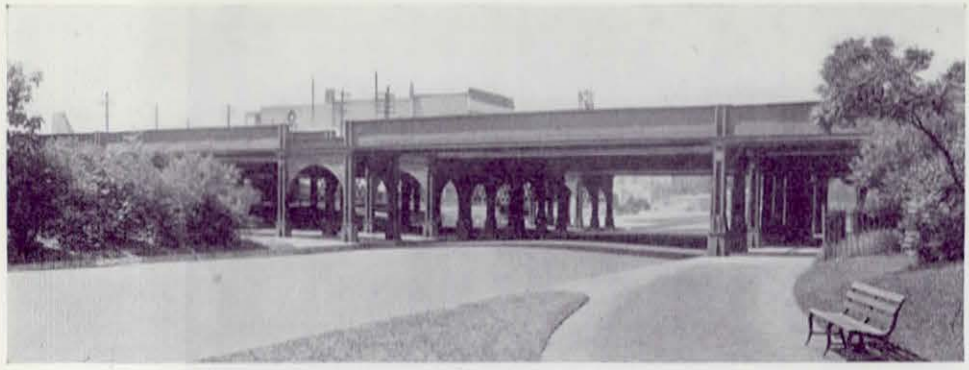


Large Expenditures for Grade Separation Have Been Incurred by Reason of "Super-Highway" Projects

gram has come about as a result of an altered public opinion; court decisions have played a minor role. But the decision of the United States Supreme court, which was handed down on March 4, and which is considered at length on another page, appears to place the contention of the railroads on even firmer ground. In this case, which involved an appeal from a decision of the Supreme Court of Tennessee, the Nashville, Chattanooga & St. Louis had contested a decision of the lower court that sustained a state law which assesses half the cost of grade separation against the railroad. The decision of the United States Supreme court not only questions the equity of an arbitrary division as contrasted with a division predicated on the relative benefits realized, but also raises the issue of enhanced advantages, to competing forms of transportation and the possible influence of the motive of unemployment relief in undertaking the particular project. The influence of this decision will far transcend its effect in the particular case at issue.

Possibly the most conclusive demonstration of the potentialities of grade separation is afforded by the program of such work now being prosecuted under the provisions of Title II of the National Recovery Act. As shown in the table, this embraces 551 projects involving an estimated expenditure of $25,220,321. The widely distributed character of this work is indicated by the fact that only four states, namely, Connecticut, Delaware, Maine and Rhode Island are not represented. While there is a disparity in the number of separations in the different states, there being 78 in Illinois, 42 in Texas and 31 in Minnesota, compared with only 1 in Maryland and 2 in New Hampshire, the fact remains that 19 states are represented with 10 or more projects, and that the average for the 44 participating states is 12.5. The average cost per separation is about $46,000, the average outlay for undercrossings being but little more than that for the overcrossings.

It should be borne in mind that these 551 projects were undertaken as a result of voluntary action on the



The Railways Have Been Compelled to Bear the Burden of Grade Separation for Many Years.—A Structure Embraced in One of the Earliest Projects—"Midway" Undercrossing on the Illinois Central in Chicago. Built in 1893, Replaced in 1919

part of state highway officers under the provisions of the emergency appropriation for federal-aid highway work that authorized but did not require, allocations to grade separation work. There was no specific federal appropriation exclusively for this work.

Specific suggestions for the more active prosecution of grade crossing elimination with federal funds have emanated from several sources. The most ambitious of these is the one proposed by the American Institute of Steel Construction, which advocated an expenditure of $1,400,000,000 to this end. A more conservative program, advanced by the Security Owners Association on December 29, 1934, called for an expenditure of $863,614,067 on 12,951 projects, the maximum number allocated to any one state being 2,742 to the state of Michigan. A suggested program submitted to the Senate on February 14, by Senator Hayden embraces 4,058 separations, estimated to cost $461,881,500.

Railroads Get Busy

In the meantime, a committee of railway engineers under the chairmanship of R. H. Ford, assistant chief engineer of the Chicago, Rock Island & Pacific, has been engaged in a nation-wide campaign to lay an effective ground work for the expeditious prosecution of grade separation projects immediately after funds are made available. This committee is an outgrowth of group activity on the part of railway engineers in the middle west in the conduct of negotiations with the state and federal highway authorities for the purpose of fostering grade separation work under the provisions of the National Recovery Act. This earlier movement, which had its inception in the fall of 1933, built up a spirit of co-operation between the railway engineers and highway officers in the states affected that was fruitful of excellent results, as evidenced by the fact that, as shown in the table, 163 projects or 30 per cent of the 551 projects authorized in the entire country were located in Illinois, Iowa, Minnesota and Missouri. It is shown also by the adoption of a program for the more adequate protection of 297 crossings in the state of Illinois.

Realizing the merits of this plan and keenly alive to the advantages of thorough preparation in the prosecution of additional grade separation work under the provision of the pending legislation, the Association of American Railways took the necessary steps to place this movement on a nation-wide basis. This was done by extending the jurisdiction of an existing committee of engineers of the American Railway Association, namely, the Special Committee on Engineering Research, Inland Waterways and Intercoastal Canals, to "matters affecting grade crossing separations and related problems."

One Type of Overcrossing

In addition to Mr. Ford, who is the chairman of this committee, the officers are W. D. Faucette, chief engineer Seaboard Air Line, vice-chairman, and A. P. Wenzell, special engineer, New York Central, secretary. There is also an executive committee that includes, C. F. Loweth, chief engineer, Chicago, Milwaukee, St. Paul & Pacific; R. A. Feldes, assistant to vice-president, New York Central, Chicago; I. W. Geer, chief engineer Western region, Pennsylvania; F. E. Morrow, chief engineer, Chicago & Western Indiana; and J. E. Willoughby, chief engineer, Atlantic Coast Line.

The first step taken by the committee after the enlargement of its duties was to effect an organization that provided an official contact with the authorities in each state, who exercise jurisdiction over grade separation and protection, and also with the district engineers of the United States Bureau of Public Roads. These state chairmen were listed in the *Railway Age* of December 8, page 777.

The appointment of these state chairmen was of utmost importance, as the committee adopted as its primary function the development of tentative agreements between the railroads and the states as to the particular crossings that should have priority in grade separation programs so that preliminary steps might be taken for the development of general plans for the crossings on the preferred lists. However, before a start could be made on them, it was necessary to decide on some arbitrary figure for the number of crossings and on some basis for their allocation among the states.

In the absence of any inkling as to the size of the appropriation or apportionment to grade separation, it was necessary for the committee to take a shot in the dark, and for want of a better figure it selected $300,000,000 as the basis for its calculations. This sum was then assumed as apportioned among the states in accordance with the criteria of population, area and highway mileage established in the statute covering the distribution of federal road funds, and was further subdivided among the railways in accordance with their line mileage in each state. Dividing this assumed allotment to each railway in each state by an arbitrary figure of $50,000 as the approximate average cost per separation, and taking the nearest whole number, provided a tentative figure for the number of separations allotted to

each railway. Using this figure as a basis, each railroad made its own selection of the grade crossings on its lines that should have priority in a separation program, and these selections were forwarded to the state chairmen, who consolidated these preferences on state maps that show both the railway lines and the state highway systems. These maps were then submitted to the state highway officers or to the state railroad commissions for their comment and criticism.

Plan Well Received

Reports forwarded by the state chairmen to the general committee indicate that this program has now been very largely completed, and that the authorities in most states have given the work their wholehearted co-operation. In a few states in which the number of railroads is small, they are dealing directly with the state or federal officers.

The committee organization that has functioned so effectively on this preliminary work will also prove of great benefit in the conclusion of negotiations for actual projects as soon as federal appropriations are made. In the meantime, the work in some states is being continued to the point of preparing plans for projects occupying preferential places on the lists, estimating costs, etc., and in studying the opportunities for abandoning unnecessary crossings.

While the number of grade crossings to be eliminated by separation will depend on the magnitude of the funds allocated, it will be influenced also by the cost of the individual projects. As stated heretofore, the average cost of the projects now being carried out is about $46,000, but this cannot be used as a criterion for future work because of the natural tendency, other considerations being equal, to select the least expensive projects first. It follows, therefore, that as the campaign for elimination is carried forward, more costly projects must be included, thereby raising the average outlay.

As an illustration, a tentative list proposed by Senator Hayden included 1,756 "early projects" having an average estimated cost of $105,000 and 2,302 "one-year projects" averaging $120,000 each. Other estimates of average cost run all the way from $50,000 to $300,000, but figures submitted to the Federal Bureau of Public roads indicate an average figure for projects in the immediate future of about $93,000.

How Apportioned

The apportionment of funds to the states or to individual crossings is still a matter of conjecture. While the studies made by the A.A.R. committee were based on a distribution following the provisions of the federal aid act, Senator Hayden has proposed a rule as to future appropriations for grade separation under which the apportionment to the states would be based one-half on population; one-quarter on the mileage of federal aid roads and one-quarter on the railway mileage in each state.

There is a possibility also that the federal authority designated to administer the funds provided will insist on criteria for the selection of the projects differing in some measure from those employed in negotiations between the railroads and the states. Of primary importance is the degree of permanence of both the highway and the railroad, not only from the standpoint of the abandonment of either in its entirety but also with respect to the possibility of a local relocation. However, of far greater complexity is the task of developing an acceptable rule for determining the relative justifiability of the elimination of any group or groups of crossings and, thus far, no one method has been generally accepted. One leading authority is of the opinion that volume of traffic on both the railway and the highway is the only reliable yardstick.

Another influence that may have some effect originates in the fact that such federal allocations as are made for grade separation are, after all, appropriations that have unemployment relief as their primary objective. Apportionments may, therefore, be modified in some measure by the relative intensity of unemployment in various areas or communities.

How soon additional money from the federal treasury will be made available for the separation and protection of highway crossings is as yet purely a matter of conjecture. But inasmuch as the proposal to use federal funds for these purposes has been advocated by such a variety of interests and has not suffered the criticism that has been directed at almost every other class of public work, it should be much more likely to receive favorable consideration at the hands of Congress. However, one thing is certain. With the ever increasing speeds of both highway and railway traffic, the need for a reduction in the hazard at the points of conflict of these two forms of transport is becoming more urgent as time goes on, and whether or not grade separation is prosecuted on an accelerated scale in the immediate future, the projects now being studied by highway and railway engineers will be carried out eventually. Consequently, federal appropriations for grade separation made at this time will serve merely to advance a program that is certain to be carried out in the end. In the meantime, the work will go on at a modest scale under the provisions of the Hayden-Cartwright Act.

Public Works Highway Program

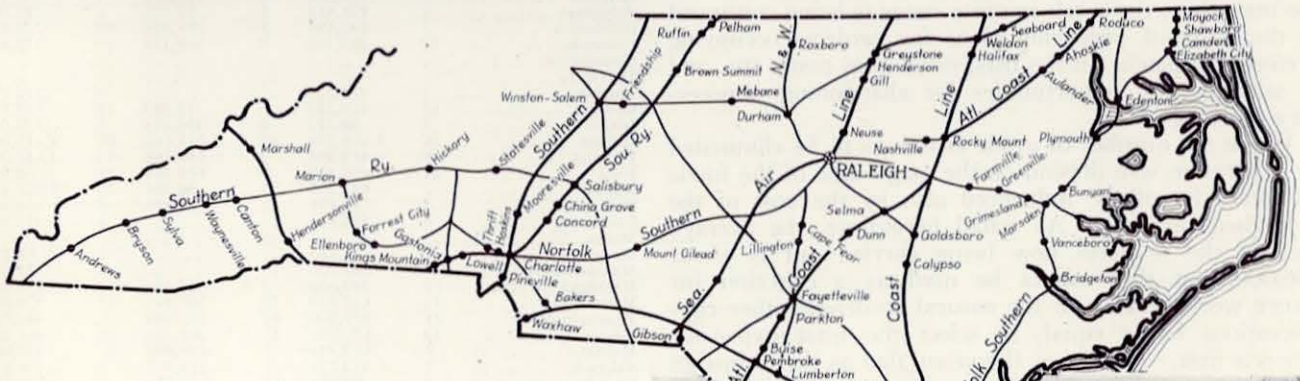
Highway-Railroad Grade Separation Projects As of January 31, 1935

State	Highway Over Railroad Estimated		Highway Under Railroad Estimated		Total Estimated	
	Number	Cost	Number	Cost	Number	Cost
Alabama	8	$288,942	1*	$4,178	9	$293,120
Arizona	4	150,387	5	314,875	9	465,262
Arkansas	5	429,813	3	52,067	8	481,880
California	7	547,196	3	191,818	10	739,014
Colorado	10	364,472	9	189,174	19	553,646
Connecticut	..	.....	..	.....	..	.....
Delaware	..	.....	..	.....	..	.....
Florida	5	271,258	..	.....	5	271,258
Georgia	15	470,252	3	73,289	18	543,541
Idaho	3	68,372	3	455,654	6	524,026
Illinois	36	1,695,354	42	2,715,736	78	4,411,090
Indiana	9	475,525	5	541,768	14	1,017,293
Iowa	24	605,579	3	103,304	27	708,883
Kansas	7	943,215	3	84,403	10	1,027,618
Kentucky	4	135,191	1	35,578	5	170,769
Louisiana	6	376,841	..	.....	6	376,841
Maine	..	.....	..	.....	..	.....
Maryland	1	96,705	..	.....	1	96,705
Massachusetts	3	181,076	..	.....	3	181,076
Michigan	5	243,950	3	506,350	8	750,300
Minnesota	13	621,624	18	307,845	31	929,469
Mississippi	11	177,250	10	265,504	21	442,754
Missouri	14	692,912	13	268,315	27	961,227
Montana	9	183,244	7	148,845	16	332,089
Nebraska	7	334,754	1	124,077	8	458,831
Nevada	3	90,694	2	48,276	5	138,970
New Hampshire	2	101,381	..	.....	2	101,381
New Jersey	3	135,958	4	237,218	7	373,176
New Mexico	6	151,711	4	388,428	10	540,139
New York	9	573,610	10	728,429	19	1,302,039
North Carolina	5	70,874	8	202,854	13	273,728
North Dakota	2	50,339	4	94,912	6	145,251
Ohio	2	410,100	..	.....	2	410,100
Oklahoma	6	130,494	3	45,963	9	176,457
Oregon	4	95,254	4	116,545	8	211,799
Pennsylvania	8	700,627	2	81,034	10	781,661
Rhode Island	..	.....	..	.....	..	.....
South Carolina	5	78,509	4	53,026	9	131,535
South Dakota	2	101,005	1*	10,615	3	111,620
Tennessee	7	196,050	..	.....	7	196,050
Texas	12	701,470	30	1,293,180	42	1,994,650
Utah	5	108,797	3	134,077	8	242,874
Vermont	1	8,741	..	.....	1	8,741
Virginia	16	747,292	4	125,222	20	872,514
Washington	8	135,323	4	165,968	12	301,291
West Virginia	5	320,525	1	50,645	6	371,170
Wisconsin	3	236,349	7	392,949	10	629,298
Wyoming	1	13,666	2	155,519	3	169,185
Total	321	$14,512,681	230	$10,707,640	551	$25,220,321

* Reconstruction.

Federal Funds for Highway Crossing Protection

Twenty states now have programs involving more than 1,223 crossings and others are proposed



In North Carolina Flashing-Light Crossing Signals Are Being Installed at 90 Locations as Indicated on the Map. Of These Projects 28 Are on the Southern, 20 on the Seaboard Air Line, 23 on the Norfolk Southern, 18 on the Atlantic Coast Line and 1 on the Norfolk & Western. The View Above Shows an Installation in Florida on the Atlantic Coast Line, and the Illustration at the Right Shows the New Signals at a Crossing in North Carolina on the Seaboard

AT least twenty states are now installing or planning to install automatically-controlled signals at highway-railroad crossings which are to be paid for from the states' apportionments of Federal Public Works funds. Further activities in this field are to be commended, not only as a means of improving safety on the highways but as an aid in reducing unemployment among furloughed railway signal employees, as well as mechanics in the factories of signal manufacturers and those who furnish such accessories as batteries and wire.

The materials and labor required for a crossing signal installation vary with circumstances, ranging from a single-track project in non-automatic block signal territory to a multiple-track project in block signal territory. However, it may be stated roughly that a crossing signal project requires about 1,750 man-hours of labor for the manufacture of the materials, estimating, drafting and construction in the field. With a total of 1,223 projects under way, this means that about 2,140,250 man-hours are required or the employment of 1,028 men for 12 months, on the basis of 40 hours per week. In practically all cases the men called back to duty for this work have been unemployed for several years and the majority have been on public relief.

Authority for Procedure

Section 204 of Title II—Public Works and Construction Projects—of the National Industry Recovery Act, authorizes, among other items, the use of funds to pay all or any part of the cost of improvements to promote safety at highway railroad crossings. In compliance with this act, Thos. H. MacDonald, chief of the Bureau of Public Roads, United States Department of Agriculture, issued on November 22, 1933, the following explanation: "Grade crossing protection by installation of satisfactory and approved warning devices such as signals, lights, etc., at crossings, which cannot be eliminated eco-

nomically, serves to minimize hazards to traffic. Public works highway funds may be used to pay the entire cost of such approved installations in accordance with proper plans and specifications." Mr. MacDonald further stated: "We will accept the specifications for materials and electrical work prepared by the railroad companies as it is believed that their signal departments can be relied upon properly to take care of these features of the work."

Current Programs of Highway Crossing Protection Being Installed in Twenty States at Federal Expense

State	Approx. Amount	Approx. No. Crossings
Alabama	.....	16
Florida	.....	39
Georgia	.....	12
Illinois		
Signals	$475,000	297
Reflector signs	25,000	354
Michigan	.....	28
Minnesota	30,000	12
Mississippi	.....	6
Montana	.....	2
Nebraska	1,650	1
New Jersey	.....	274
New Mexico	.....	1
North Carolina	250,000	90
Oklahoma	.....	2
Oregon	16,000	8
Pennsylvania	6,500	4
South Carolina	50,000	16*
Utah	.....	8
Virginia	35,000	11*
Washington	14,000	7
Wisconsin	100,000	35*
		1,223

* Approximate.

The public works funds authorized for highway purposes under the acts of June 16, and June 18, 1934, totaled $600,000,000. Of this amount, approximately three million dollars was allocated by 20 states for the protection of 1,223 grade crossings, as shown in detail in the table. Florida, South Carolina, North Carolina, Georgia, Alabama and Virginia have already started negotiations for a second program involving about 80 additional crossings, while New Jersey has announced a program involving protection at 274 crossings. Various bills now before congress propose the appropriation of further large sums for highway-railroad crossing signals, and, on account of the permanent benefits effected, and the relief of unemployment, there is little doubt that activity in the construction of crossing signals will be continued.

Protection Needed

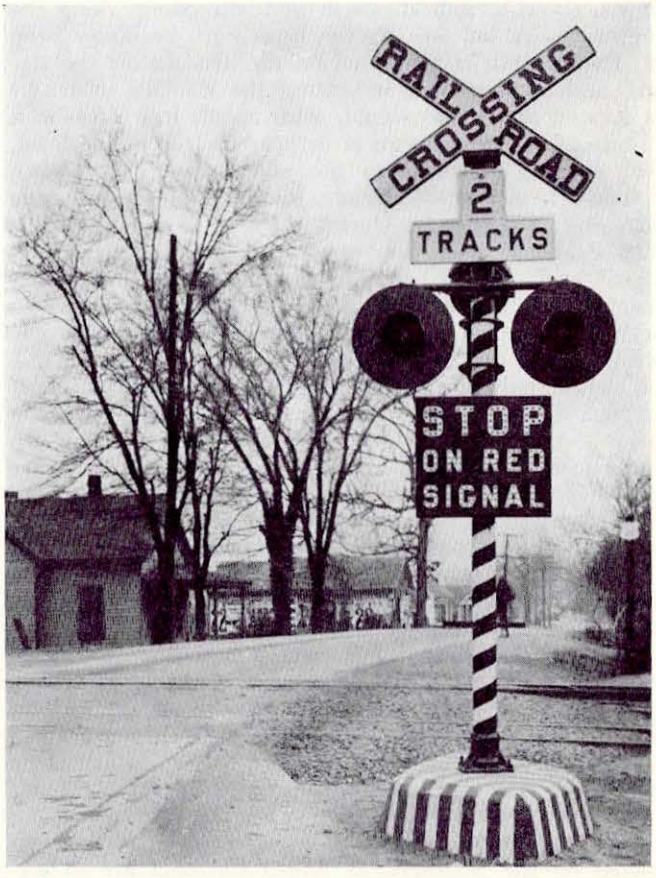
The separation of grades between highways and railroads is, of course, the ultimate in safety. However, with grade separations averaging from $50,000 to $90,000 each, and with more than 237,000 crossings in the United States, it is evident that it is entirely impracticable to separate the grades at any considerable proportion of the total. At many crossings, where traffic on the highway and the railroad does not justify expenditures for grade separation, or where local conditions make such improvement impracticable, crossing signals serve to minimize the hazard. The cost for such an installation approximates $2,500 to $4,000, depending on the number of tracks and other conditions, but even the higher figure is small in comparison with the cost of grade separation.

According to the latest information available, only about 30,400 of the 237,000 crossings in the United States are protected by other than fixed signs. Of these, about 4,700 are protected by gates (of which 2,800 are in part-time operation), 1,200 by watchmen full time and 5,000 by watchmen part time, 16,700 are protected by automatically-controlled visible signals and 3,600 by audible signals. It is evident, therefore, that there is a large field for the application of signal protection at thousands of crossings.

So far as cost is concerned, the hazard at highway-railroad crossings has been brought about primarily by the construction of improved roads and the development of motor vehicles. Therefore, the protection should be installed at the expense of the public as users of the highway. This fact has been recognized by such states as Pennsylvania, Indiana and Michigan, which have for years paid one-half of the cost of installations ordered by the state.

However, the proposal that a state or the Federal Government pay one-half or all of the cost of a highway-railroad crossing signal installation is somewhat of a "white elephant" gift because the burden of replacement of parts, maintenance and operating costs are to be met by the railroad and this cost will, in 15 to 20 years, equal the original cost of the installation. Michigan has recognized its responsibility in these matters by paying $10 monthly toward the maintenance and operation of the signals at each crossing where the installation is made under order.

In the projects already completed or under way as a part of the Public Works program, the charges for materials and labor are being paid from the state allotments, but it is understood that the railroads are to assume the charges for maintenance and operation. It is possible, however, that these latter charges can be adjusted at a later date; the present problem is to use the funds available to the best advantage in improving highway safety and at the same time provide work for the maximum number of unemployed. Another consideration is the fact that audible signals only (bells)



Signal Installed at Pineville, N. C., Where Highway 21 Crosses the Track of the Southern

are in service at 3,600 crossings in the United States, and, in many of these instances, greater benefit would be effected in improved safety to highway users by adding visible signals at these crossings than would be accomplished by making complete new signal installations at other crossings.

Typical Crossing Signal Programs

Indicative of the highway crossing protection programs that may be adopted is the action already taken by North Carolina. It was not only one of the first few states to see the opportunity for installing crossing signals as a part of the P.W.A. activities, but, as early as 1933, it adopted an extensive program involving 90 crossings and pushed the negotiations to the extent that approximately 24 of the installations are already completed and in service, while materials are delivered for the remainder and construction is being prosecuted rapidly, looking toward early completion. Furthermore, this state has plans made for a second program involving 51 more crossings at which signals are to be installed. Florida is another state which started early, having perfected a program involving 4 crossings which have already been completed with plans under way for 31 more similar projects.

The first program in North Carolina included the installation of signals at 20 crossings on the Seaboard Air Line, 23 on the Norfolk Southern, 28 on the Southern, 18 on the Atlantic Coast Line and 1 on the Norfolk & Western. As of February 15, the installations completed in North Carolina were on the Seaboard Air Line, the Norfolk Southern and the Southern, while those four completed in Florida are on the Atlantic Coast Line.

The signals installed by the four railroads mentioned above are of the standard flashing-light type with back lights, showing indications in both directions along the highway. A button-reflector type sign, reading "Stop on Red Signal," is mounted on the mast below the signal, and another sign indicating the number of tracks is located above the signal, with a cast-iron crossbuck "Railroad Crossing" sign at or near the top of the mast. The signals conform to the standard of the Association of American Railroads, Joint Committee on Grade Crossing Protection, as shown in Fig. 7 of bulletin No. 1. The Seaboard uses four separate signal units on each signal, each equipped with a 10-volt 18-watt, double-filament lamp, the purpose of the separate units being to secure a wider spread of the indication than is possible with a single-unit incorporating a back-light.

The signals are controlled automatically by track circuits so as to afford at least 20 seconds operation prior to the arrival of the fastest train at a crossing. In some instances, special cutouts and control circuits are provided to eliminate unnecessary operation of the signals when a train is switching on the main track or when making a movement into or out of a passing siding.

The signals completed so far have been located at points where alternating current power is available so that this type of energy is used normally for the operation of the flashing-lights. As a stand-by source of energy for the operation of the signals in case of an a-c. power outage, the installations on the Atlantic Coast Line in Florida and on the Seaboard Air Line in North Carolina are equipped with storage battery which is on floating charge through a rectifier. Both of these roads use direct-current track circuits operated from cells of primary battery. The crossing signal installations completed on the Southern in North Carolina are in a-c. automatic block territory so that the flashing-lights are normally energized from the a-c. supply, a set of primary battery cells being provided as an emergency stand-by.

In general, each of the roads involved followed its own standards for materials and methods of detail construction. On the Seaboard Air Line, a printed form was prepared on which to list all of the materials that would logically be used on a crossing signal installation. One copy was then prepared to show the materials required for each installation. The individual items on the 20 proposed projects were then totaled and bids were secured from each of two or more signal manufacturing companies to supply all of the materials required for the entire 20 projects. The bids were then submitted to the state officers who let the contracts to the lowest bidder. With this procedure, the state officers had one transaction in purchasing the materials for all 20 installations.

The materials were shipped to the State Highway Department, in care of the railroad, at a designated central point. The materials for each project were then assembled and loaded in supply cars for shipment to the installation. The freight on the materials to the point of destination was paid by the state as a part of the material cost. The field investigations and the direction of the construction were under the jurisdiction of a crossing signal supervisor, reporting to the signal engineer of the railroad. The signal construction forces of the railroad handled the installation, the charges for labor and for supervision of the field construction being paid by the state.

In general, the same methods of procedure were followed on the Atlantic Coast Line and on the Southern. However each of these roads followed its own standard procedure in estimating and ordering material, which differ in some respect from that used on the Seaboard Air Line. The Atlantic Coast Line prepared complete plans for each installation, and the plans for a group of projects, together with specifications, were submitted for bid, as one complete contract for materials to be furnished on the basis of the plans. The Southern prepared plans for each project, but assembled on one requisition all of the similar items of one manufacturer to be used on all of the proposed projects in a state. Bids were then received from individual manufacturers. Each road submitted the bids to the state for the purchase of materials.

Grade Separations Benefit Road Users Primarily

WASHINGTON, D. C.

A PRINCIPLE long contended for by the railroads in connection with rail-highway grade separation projects, that such projects under present conditions are of greater importance to the highway users than to the railroad crossed, was recognized by the Supreme Court of the United States in a decision rendered on March 4 in a case instituted by the Nashville, Chattanooga & St. Louis against the Tennessee State Highway Commissioners. The decision reversed the judgment of the supreme court of Tennessee and remanded the case to it for further proceedings, on the ground that it had erred in reversing a decision by the trial court which had held that an order of the state commission requiring the railroad to pay half the cost of a grade separation at Lexington, Tenn., and the state statute as applied, were arbitrary, unreasonable and void.

The Supreme Court did not pass on the question as to whether the railroad should pay a portion of the cost but decided that the state supreme court had erred in refusing to consider the special facts relied upon by the railroad and whether the facts established as arbitrary and unreasonable the imposition upon the railroad of one-half the cost of the underpass on a highway built to compete with the railroad.

The court pointed out that "a statute valid as to one set of facts may be invalid as to another," and that "a statute valid when enacted may become invalid by change in the conditions to which it is applied."

"We have no occasion to consider now," the court said, "whether the facts presented by the railway were of such persuasiveness as to have required the state court to hold that the statute and order complained of are arbitrary and unreasonable. That determination should, in the first instance, be made by the supreme court of the state." Justices Stone and Cardozo dissented and Justice McReynolds took no part in the consideration of the case.

Timely Decision

The decision is of special interest at this time when the federal government is making plans for large expenditures for grade crossing elimination, in connection with which the question of charging part of the cost to the railroads has been under discussion, although it is understood that the government has been calculating upon paying the cost itself.

"Here were adduced," the majority opinion by Justice Brandeis says, "—as tending to show that it was arbitrary and unreasonable to impose upon the railway one-half the cost of this underpass—not only the revolution wrought by motor vehicle transportation and the creation and purposes of the federal-aid highway system; but also the local conditions at Lexington; the character of the place where the underpass was ordered built; the extent of the railroad operations there; the character of the existing highway facilities, and of their use at that point; the location of the proposed highway; the occasion for its construction; the use contemplated; the reason why the underpass was ordered; the depletion of the railway's revenues resulting from the construction of federal-aided highways, particularly in recent years; the necessary effect of this new highway upon its rail traffic and revenues; and the burden of taxation already borne by the railway as compared with that of the owners of the motor vehicles who will use the new highway.

"No case involving like conditions has been found in any of the lower federal courts; nor, excepting the case here under review, has any such been found among the decisions of the highest courts of any state. The supreme court of Tennessee did not consider whether, in view of the facts relied upon, it was arbitrary and unreasonable to impose upon the railway one-half the cost of the underpass."

Outstanding Facts

Among the facts which the Supreme Court mentions as "specifically found, or of which the courts could take judicial notice," are:

The decree of the trial court recites, as a finding upon the evidence, "that this underpass is a part of a state-wide and nation-wide plan to foster commerce by motor vehicle on the public highways, the result of which is to afford competition with railroads, and that the decision to build this underpass, its location and construction, was not in any proper sense an exercise of the police power, but rather, as set forth in the bill of complaint, pursuant to a general plan of internal improvement fostered by the Congress of the United States in conjunction with the several states to make a nation-wide system of superhighways in the interest of interstate commerce by motor vehicle, much of which is in active competition with the railroads themselves"; "that in the interest of commerce by motor vehicles on the public highway, this was a proper engineering project, properly conceived, located, designed and constructed"; but "that this underpass did not involve an exercise of the police power any more than many other features of this project, such as elimination of curves, grades, widening the pavement, et cetera."

The relief of the unemployment incident to the business depression has been the main incentive for highway construction since April 4, 1930—the period in which the highway here in question was undertaken and completed.

To achieve its purposes, the federal government has made large contributions to the cost of the federal-aid highway system. In each year, it has made to each state grants in money, proportioned according to various factors, to be expended in defraying up to one-half the cost of constructing therein the designated highways.

Both the federal-aid legislation and the regulations adopted thereunder encourage the elimination of grade crossings.

The general principles adopted by the Bureau of Roads to be applied where possible treat "all intersections of a railway and highway at grade" as "a condition dangerous to traffic on the highway—which should not exist in a well designed and completed system"; treat topographic conditions as having only an "incidental bearing"; and refuse to treat "unobstructed view of the railway track from the highway" as constituting a safe crossing.

Federal-aid highways are designed so that motor vehicles may move thereon at a speed commonly much greater than that of railroad trains. The main purpose of grade separation therefore is now the furtherance of uninterrupted, rapid movement by motor vehicles.

The railroad has ceased to be the prime instrument of danger and the main cause of accidents. It is the railroad which now requires protection from dangers incident to motor transportation. Prior to the establishment of the federal-aid system, Tennessee highways were built under the direction of the county courts, and paid for out of funds raised locally by taxation or otherwise. They served, in the main, local traffic.

The long distance traffic was served almost wholly by the railroads and the water lines. Under those conditions the occasion for separation of grades was mainly the danger incident to rail operations; and the promotion of safety was then the main purpose of grade separation.

Then, it was reasonable to impose upon the railroad a large part of the cost of eliminating grade crossings; and the imposition was rarely a hardship. For the need for eliminating existing crossings, and the need of new highways free from grade crossings, arose usually from the growth of the community in which the grade separation was made; this growth was mainly the result of the transportation facilities offered through the railroad; the separation of grade crossings was a normal incident of the growth of rail operations; and as the highways were then feeders of rail traffic, the community's growth and every improvement of highway facilities benefited the railroad.

The effect upon the railroad of constructing federal-aid highways, like that here in question, is entirely different. They are not feeders of rail traffic. They deplete the existing rail traffic and the revenues of the railroads. Separation of grades serves to intensify the motor competition and to further deplete rail traffic. The avoidance thereby made possible of traffic interruptions incident to crossing at grade are now of far greater importance to the highway users than it is to the railroad crossed. For the rail operations are few; those of motor vehicles very numerous.

Lexington is a rural community of 1823 inhabitants located in a sparsely settled territory. The construction of the new highway with the underpass were not designated to meet local transportation needs. It was undertaken to serve as a link in a nation-wide system of highways.

The new highway, paralleling lines of the railway and intended for rapid moving motor vehicles, will, through competition for both freight and passenger traffic, seriously decrease rail traffic and deplete the railway's revenue and net earnings. Practically all vehicles moving upon it will directly or indirectly compete for traffic with the railway.

How disastrously such competition will affect the railway's traffic and revenues is shown by its own experience since the state commenced, with the aid of the federal government, a system of highways paralleling the lines of the railway.

That the decrease in the railway's traffic was due mainly to increased motor competition following the construction of the new highways, appears from the fact that the decrease began while general business was active; and that, even in the years of economic depression, the railway's freight traffic was practically constant in the relatively few regions where its rail lines were not paralleled by hard surfaced highways; and that traffic

increased when highways paralleling its lines were temporarily closed for reconstruction. The reduction in traffic and depletion in revenues has been particularly severe during the three years preceding 1933.

While the railway, the sufferer from the construction of the new highway, is burdened with one-half the cost of the underpass, the owners of trucks and busses and others, who are beneficiaries of its construction, are immune from making any direct contribution toward the cost.

It is true that one-half of the cost is by law to be borne by the highway fund of Tennessee (except in so far as it may be covered by the federal aid) and that the truck and bus owners and others contribute as taxpayers to that fund.

But, while nearly 28 per cent of the gross revenues of the railway is required annually to pay the state and local taxes and the cost of maintaining the roadway acquired and constructed at its own expense, the state commercial motor carriers, which are supplied by the state with the roadway on which they move, pay in state and local taxes not more than 7 per cent of their gross revenues.

The taxes laid upon truck and bus owners are clearly insufficient to pay their fair share even of the cost and maintenance of the highways which serve them. Motor vehicle taxes of all kinds, ad valorem, privilege, license plate, and others will not pay for one-half of the annual expenditure in Tennessee for highways. The balance is being paid in part by general property taxes, in part by borrowing and in part by the federal government.

Of the ad valorem taxes paid by the railway to the state and the political divisions thereof, about 20 per cent is allocated directly to roads, some of which are no longer feeders to its traffic, but serve as highways for the traffic taken by its competitors.

The relative pro-rata tax burden laid upon common carriers by motor vehicle is alleged to be one-fourth of that laid upon the railroads.

The opinion continues, saying that "the promotion of public convenience will not justify requiring of a railroad, any more than of others, the expenditure of money, unless it can be shown that a duty to provide the particular convenience rests upon it;" and that when particular individuals are singled out to bear the cost of advancing the public convenience, "that imposition must bear some reasonable relation to the evils to be eradicated or the advantages to be secured." "While moneys raised by general taxation may constitutionally be applied to purposes from which the individual taxed may receive no benefit, and, indeed, suffer serious detriment, so-called assessments for public improvements laid upon particular property owners are ordinarily constitutional only if based on benefits received by them."

The case was started in the lower court by Fitzgerald Hall, then general counsel of the Nashville, Chattanooga & St. Louis, and was argued by him in the Supreme Court after he became president of the road.

* * *

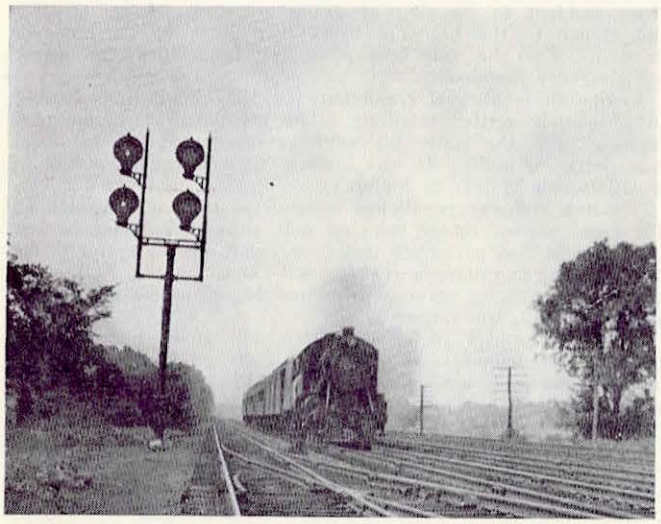


Photo by Paul T. Warner

On the Reading, Near Valley Forge, Pa.

C. G. W. to Be Reorganized

THE Chicago Great Western petitioned the Federal District Court in Chicago on February 28 for authority to reorganize under the National Bankruptcy Act and was granted permission on the same day to file bankruptcy proceedings. In its petition the railroad stated that it is without funds to pay $710,880 interest due on March 1 on first mortgage four per cent bonds, that it has no means of borrowing or otherwise procuring such funds, and that it is unable to meet its debts as they mature, and, therefore, desires to effect a plan of reorganization pursuant to Sec. 77 of Chap. VIII of the acts of Congress relating to bankruptcy. The petition for reorganization was granted by Federal Judge Charles E. Woodward, who authorized the company to remain for the present in possession of the properties. No trustee was asked in the petition and none was appointed.

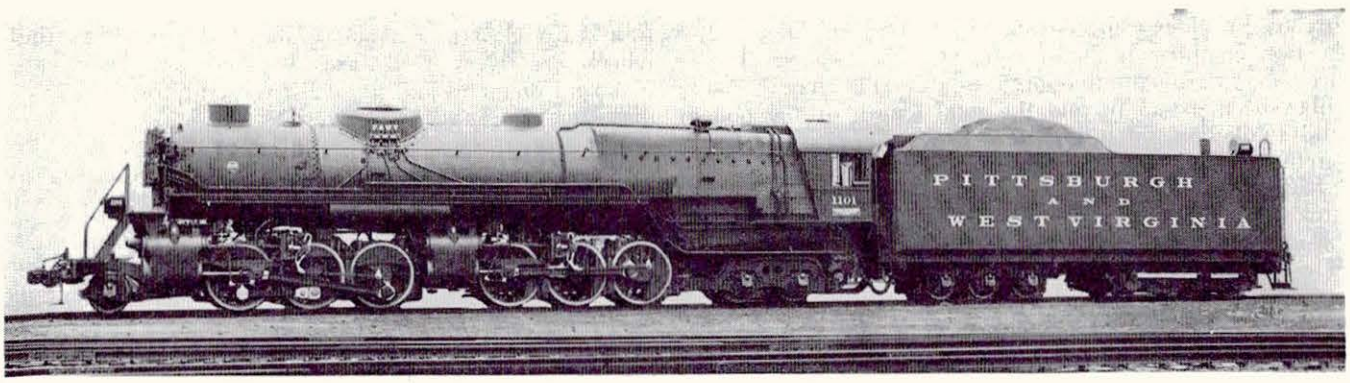
Financial Problem Not Intricate

The financial problem of the railroad is not intricate, there being few unsecured creditors and none with debts more than six months old. All equipment trust obligations have been paid to date. As a result, in a plan of reorganization there will have to be taken into consideration only a well-secured debt of about $1,250,000 to the Reconstruction Finance Corporation, and a secured debt of about the same amount to the Railroad Credit Corporation, the first mortgage bonds, of which between $35,000,000 and $36,000,000 are outstanding, with equipment trust notes, places the long-term indebtedness of the company at $43,667,679. In 1929 the company earned its fixed charges 1.68 times; in 1930, 1.74 times; in 1931, 1.48 times; in 1932, 0.30 times and in 1933, 0.74 times. During 1934 its earnings were insufficient to meet the interest on Chicago Great Western first mortgage four per cent bonds, payable March 1, 1935.

In filing the petition Patrick H. Joyce, president, stated that the company is not insolvent and could have continued in operation but that better attention can be given to the actual operation of the railroad with the financial problems lifted by a plan which he thought could be consummated within six months, provided no obstruction was thrown in the way of the reorganization. He also revealed that recent conferences with representatives of the Reconstruction Finance Corporation justified the hope that if a readjustment plan is carried out which will reduce fixed charges of the company, the government lending agency will make further advances. Because of these general conditions, a general scaling down of fixed charges is the objective.

Incorporated in 1909

The Chicago Great Western Railroad Company was incorporated on August 11, 1909, as the successor under a plan of reorganization dated June 1, 1909, to the Chicago Great Western Railway, which was sold under foreclosure on August 21 of the same year. It owns the entire capital stock of the Mason City & Fort Dodge Railroad Company, and the Leavenworth Terminal Railway & Bridge Co. The Omaha Grain Terminals is controlled by the Chicago Great Western through its subsidiary, the Mason City & Fort Dodge. On July 1, 1934, the Great Western also took over the properties of the St. Paul Bridge & Terminal Co., and the St. Paul Union Stockyards Company under a 99-year lease. A total of 1,518 miles of line is operated by the Great Western, of which 1,025 are owned by the company.



Single-expansion Articulated Locomotive Built by the Baldwin Locomotive Works for the Pittsburgh & West Virginia

P. & W. V. Articulated Locomotive Replaces Two Consolidations

Single-expansion 2-6-6-4 type locomotives built by Baldwin have starting tractive force of 113,500 lb.

THREE new single-expansion articulated locomotives built by the Baldwin Locomotive Works have recently been placed in service on the Pittsburgh & West Virginia, a short road 138 miles long, connecting the rich coal fields of western Pennsylvania with the Pittsburgh district and thence across the upper end of West Virginia into Ohio. Passenger traffic is extremely light; in fact, on most of the road no passenger trains are operated. The freight traffic is heavy and consists largely of soft coal. Heretofore this has been handled by 22 Consolidation and three Mikado locomotives. Of the 2-8-0 type locomotives, which were built between 1907 and 1921, nineteen have 58-in. drivers and a rated tractive force ranging from 54,000 lb. to 58,600 lb. The three 2-8-2 type locomotives, which were built in 1918, have a rated tractive force of 54,725. Until last year the only new power purchased since 1921 was one Pacific type passenger locomotive.

The new articulated locomotives have a rated tractive force of 97,500 lb. for the locomotive itself which may be supplemented by a Bethlehem auxiliary locomotive developing 16,000 lb. additional tractive force. This is applied to the rear six-wheel tender truck. One of the new locomotives is, therefore, capable of performing the work formerly requiring the use of two of the older locomotives. They will be employed mainly for hauling coal trains on the 35½-mile run from Connellsville, Pa., to Rook, Pa., a suburb of Pittsburgh.

In the preparation of the design the builders were restricted to an axle load of 65,000 lb., a track curvature of 18 deg., and to certain specified clearances. The stack height is 16 ft. 2 in.; the cab width, 10 ft. 6 in., and the width over running boards, 11 ft. 4 in.

Driving Gear and Controls

All four cylinders are 23 in. in diameter with a stroke of 32 in. Valve gear is of the Walschaert type, operating 12-in. piston valves having a maximum travel of 6 in. The maximum cut-off in full gear is 81.5 per cent. The power reverse gears are Baldwin, Type C, and the throttle is of the Glaenzer poppet valve type, located in the dome and inside connected. The dry pipe is 9 in. in diameter. The crossheads are of the Laird type with multiple-ledge guides.

The air-brake equipment, furnished by the Westinghouse Air Brake Company, is Schedule 6-ET with brake valves and fittings pedestal mounted. The two 8½-in. cross-compound air compressors are mounted on the front of the smokebox. The equipment includes two enameled main reservoirs, 20½ in. by 114 in.

Foundation and Running Gear

The frame structure is of the cast-steel built-up type with cast-iron cylinders, cast-steel bumper and a cast-steel cradle. The driving wheels are 63 in. in diameter and the wheel base of each engine is 11 ft. The two-wheel engine truck is of the Commonwealth type with outside bearings, while the four-wheel trailer truck is of the Delta type. Axles for driving, engine truck and trailing truck are of open-hearth carbon steel, annealed. Rolled steel wheels are used for the engine truck and 42-in. cast-steel wheels for the trailing truck. Connection between engine and tender is by means of a Unit-Safety drawbar used in connection with a Franklin radial buffer of the wedge type.

A new design has been worked out by the Baldwin Locomotive Works for the waist bearer between the front engine frame and the boiler. It is unique in that the middle portion of the central steam pipe is incorporated as a part of the casting itself. The upper portion of the waist bearer was designed to meet unusual conditions of limited vertical space between the driving wheels and the boiler.

Boiler

The boiler is of the straight-top, wagon-bottom type, with a Belpaire firebox, the outside diameter of the first one of the three shell courses being 94 in. The

firebox provides a grate area of 102.3 sq. ft. The combustion chamber is 74 in. long and the Security brick arch is carried on five arch tubes. The length over tube sheets is 23 ft. and the total length of the boiler and smokebox, 53 ft. 8⅜ in. The evaporative heating surface is 5,914 sq. ft. The superheater is Type A with 1,873 sq. ft. surface. Coal is fed to the grate by a Hanna stoker. Shell and firebox sheets are of open-hearth basis steel. All tubes and flues are of seamless steel. The pressure carried by the boiler is 225 lb. No feedwater heater was applied.

An interesting and simple device has been provided to show the change in the indicated water level due to the grade. This consists of a rectangular frame attached to the water columns on the right- and left-hand sides. The width of the opening is equal to the change in water level due to a change from an up-hill to a down-hill grade of 1½ per cent. Water in the glass even with the top of the frame opening when the locomotive is ascending a 1½ per cent grade, is equivalent to two gages of water on the level, as is also the case with water in the glass even with the bottom of the frame when descending the same grade.

Principal Dimensions and Weights of the Pittsburgh & West Virginia 2-6-6-4 Locomotives

Railroad	Pittsburgh & West Virginia
Builder	Baldwin Locomotive Wks.
Type of locomotive	2-6-6-4
Road numbers	1100-1102
Service	Freight
Cylinders, diameter and stroke	4—23 in. by 32 in.
Valve gear, type	Walschaert
Valves, piston type, size	12 in.
Maximum travel	6 in.
Rated tractive force	97,500 lb.
Rated tractive force, aux. locomotive	16,000 lb.
Weights in working order:	
On drivers	397,300 lb.
On front truck	27,540 lb.
On trailing truck	103,200 lb.
Total engine	528,040 lb.
Tender	377,600 lb.
Wheel bases:	
Driving	32 ft. 7 in.
Rigid	11 ft. 0 in.
Total engine	55 ft. 8 in.
Total engine and tender	98 ft. 4 in.
Wheels, diameter outside tires:	
Driving	63 in.
Front truck	36 in.
Trailing truck	42 in.
Boiler:	
Type	Belpaire, straight-top, wagon-bottom
Steam pressure	225 lb.
Fuel	Soft coal
Diameter, first ring, outside	94 in.
Firebox, length and width	144⅛ in. by 102¼ in.
Height mud ring to crown sheet, back	75½ in.
Height mud ring to crown sheet, front	95½ in.
Arch tubes, number	5
Combustion chamber, length	74 in.
Tubes, number and diameter	241—2¼ in.
Flues, number and diameter	66—5½ in.
Length over tube sheets	23 ft.
Grate area	102.3 sq. ft.
Heating surfaces:	
Firebox and comb. chamber	450 sq. ft.
Arch tubes	49 sq. ft.
Total firebox	499 sq. ft.
Tubes and flues	5,414 sq. ft.
Total evaporative	5,913 sq. ft.
Superheating (Type A)	1,873 sq. ft.
Comb. evaporative and superheating	7,786 sq. ft.
Tender:	
Style	Rectangular
Water capacity	2,000 gal.
Fuel capacity	20 tons
Trucks	Six wheel

Tender

The tender is of rectangular type and has a capacity for 20,000 gal. of water and 20 tons of coal. Its loaded weight is 377,600 lb. The tender frame is mounted on an open-bottom cast-steel frame. The six-wheel cast-steel tender trucks are equipped with American Steel Foundries clasp-type truck brakes. The tender truck wheels are rolled steel, those for the front truck being of 33 in. diameter and those for the rear truck of 36 in. diameter.

The tender coupler with 6-in. by 8-in. shank was furnished by the National Malleable & Steel Castings Company and operates in conjunction with Farlow attachments and a Miner friction draft gear.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended February 23 totaled 552,896 cars, a decrease of 29,085 cars as compared with the week before and of 22,012 cars as compared with the corresponding week of last year, but an increase of 90,581 cars as compared with 1933. This was the third consecutive week to show a decline compared with the week before and brought the cumulative total for the year to date below that for last year. Loading of miscellaneous freight and forest products showed increases as compared with last year and grain and grain products showed a small increase as compared with the week before. The summary, as compiled by the Car Service Division of the Association of American Railroads, follows:

Revenue Freight Car Loading

Week Ended Saturday, February 23

Districts	1935	1934	1933
Eastern	127,902	134,405	104,318
Allegheny	108,512	116,316	86,280
Pocahontas	44,881	45,095	36,118
Southern	87,481	89,531	73,500
Northwestern	62,962	62,791	52,147
Central Western	77,040	79,412	68,500
Southwestern	44,118	47,358	41,452
Total Western Districts	184,120	189,561	162,099
Total All Roads	552,896	574,908	462,315
Commodities			
Grain and Grain Products	26,109	27,460	28,322
Live Stock	11,234	15,292	14,429
Coal	127,075	156,270	103,360
Coke	7,430	10,068	4,907
Forest Products	25,815	22,592	14,272
Ore	2,988	3,181	1,712
Merchandise L. C. L.	142,471	144,205	143,492
Miscellaneous	209,774	195,840	151,821
February 23	552,896	574,908	462,315
February 16	581,981	600,268	517,529
February 9	592,560	573,898	504,663
February 2	598,164	565,401	486,059
January 26	555,760	563,100	475,292
Cumulative Total, 8 Weeks	4,496,072	4,497,556	3,894,774

Car Loading in Canada

Car loadings in Canada for the week ended February 23 totaled 45,012 cars, as compared with 41,463 cars last year and 45,299 cars for the previous week, according to the compilation of the Dominion Bureau of Statistics.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
February 23, 1935	45,012	23,769
February 16, 1935	45,299	23,563
February 9, 1935	44,880	24,925
February 24, 1934	41,463	23,465
Cumulative Totals for Canada:		
February 23, 1935	339,117	176,871
February 24, 1934	319,250	170,495
February 25, 1933	256,215	137,184

Comments on the Development of the U. P. Streamline Trains*

Some of the background of the investigations leading to the initial designs and data on service runs

By A. H. Fetters
General mechanical engineer, Union Pacific System

RECENTLY a six-car rail train, approximately equal in weight to 100 Cadillac cars, crossed the continent from Los Angeles to New York in 57 hours with a total fuel cost equal to that of one Cadillac making the same trip. To be more specific the main engine used $70 worth of fuel to make this 3,250-mile run. With 124 passengers aboard, the fuel cost per passenger carried is 60 cents as compared with $10 per passenger in the Cadillac. A fair approximation of the cost of fuel for a steam train of five cars and a locomotive would be around $375. While the Diesel engine on this train develops 900 hp., the average power factor for the trip was but 54 per cent.

Having been a designer and builder of the steam locomotive for over 40 years, and with 30 years experience with internal combustion rail motor cars, I cannot help but project this remarkable performance into the future, in imagination, and visualize the future of Diesel rail transportation. I believe its possibilities are very great in economy, speed, cleanliness, reliability, and utilization.

Just 30 years ago the Union Pacific built a rail motor car propelled by a gasoline engine which was the forerunner of the McKeen motor car industry. This was before the day of the electric drive, and mechanical transmissions were used.

Nearly 150 of these cars were built and successfully operated on many roads. Some of these early cars are still in operation with mileage records from one to two million miles.

Then came the era of the gas-electric rail car with its greater flexibility of operation and demonstrated economy over small steam trains in branch-line operation.

As early as 1926 your speaker went to Europe to investigate the development of Diesel engines and transmission systems as applied to rail service, but, while many interesting projects were either being tried or suggested, two pertinent facts were apparent. First; that Europeans were mostly experimenting with hydraulic, pneumatic, and mechanical forms of transmission, and second; notwithstanding the advancement of Diesel engine design at that time by such builders as M. A. N. Krupp, Fiat, Burmeister & Wain, Sulzer, Beardsmore, there was no perfected and proved type of Diesel engine having the light weight, flexibility, reliability, and other necessary characteristics for light-weight, high-speed trains, either abroad or at home.

Research in the fall of 1932 disclosed a more fertile field in this respect. Also a progressive railroad, for once, looked over the fences of convention and conviction, into the garden-patch of other and newer industries and, as a result of this research, in May, 1933, an order was placed with Pullman Car & Manufacturing Corporation for a three-car train featuring light-weight aluminum alloy construction, articulation, radical streamlining and powered with a 600-hp. Winton distillate burning, spark-ignition engine, capable of safe speeds of 90 to 110 m.p.h.

This first train was delivered in February, 1934, and after short break-in runs and a 13,000-mile tour of test and inspection, was placed on exhibition at the Century of Progress. It was also given a series of high-speed acceleration and braking tests between Grand Island and Columbus, Nebraska. Quite recently, further tests have been conducted in regard to minor adjustments and resulting in further refinements of performance. The first train has thus been used as a traveling laboratory in order to work out and apply to the following high-speed trains, some details that could only be settled by actual experience in the same manner that new automobile models are sometimes worked out on the proving grounds.

While the balanced speed of this first train is about 90 to 91 m.p.h., speeds of 110 m.p.h. have been recorded during routine test runs, with condition of grade and wind favorable. This three-car train has just been placed in revenue service between Kansas City and Salina, Kansas, making daily round trips of 374 miles. Its service weight is 98 tons.

The Six-Car U. P. Train

Last October, the second high-speed train was delivered by the Pullman Car & Manufacturing Corporation. It consists of six cars, including the power car, one mail and baggage car, three Pullman sleepers of novel construction, and the rear buffet coach.

It embraces the same general construction as the first train and weighs 210 tons serviced with fuel, water, etc., but excluding pay load. It is powered, however, with the Winton 900-hp. Diesel engine for propulsion and a Winton 120-hp. auxiliary Diesel engine which generates power for lighting, air conditioning, blower fans, battery charging, and other auxiliaries. After several tuning-up runs, this train was taken to Los Angeles and on October 22, 1934, started its record-breaking coast-to-coast run of 56 hr. 55 min.

Incidentally, this was not an attempt for a speed record, but was for the purpose of checking the proposed 39-hr. schedule from Los Angeles to Chicago, with a continuation to New York City over the New York Central on its Twentieth Century schedule of 18 hours. Had maximum speed been the object of the run, 50 hours appeared feasible. The best previous transcontinental run was 71 hours from San Francisco to New York in 1906 by the E. H. Harriman Special. The best through schedule at present is 77 hours.

During the test run of the streamliner, fuel was taken en route at Salt Lake City, Cheyenne, Omaha, and Chi-

* Extracts from a paper presented at the Railway Club of Pittsburgh, Jan. 24, 1935.

cago. Through the use of a special electric pump, the fueling rate is 100 gallons per minute, so that fuel stops averaged from 4 to 6 minutes each. The fuel capacity is 800 gallons, and a total of 2,079 gallons of fuel oil was used for both main and auxiliary engines, train heating and cooking, the distance being 3,250 miles, and the fuel rate 1.56 miles per gallon. At 4 cents per gallon this is equivalent to a cost of 2.56 cents per mile.

The highest recorded speed was 120 m.p.h. for a distance of 3 miles, 108 m.p.h. for 18 miles, and 85 m.p.h. for the 506 miles between Cheyenne, Wyo., and Omaha, Neb., on the Union Pacific, all of which are records for rail speed. The balanced speed of this six-car train is somewhat higher than for the three-car train, approximately 95 m.p.h.

Two additional high-speed trains each having nine revenue cars, and with increased horsepower, are now under construction for the Union Pacific at the Pullman plant and when finished are intended for service, one between Chicago and Los Angeles and one between Chicago and San Francisco, while the second, or six-car train, is intended for service between Chicago and Portland, Oregon. Each of these runs is approximately 2,300 miles in length. The schedules will be under 40 hours.

Streamlining

Streamlining the exterior of fast moving vehicles to reduce power consumption due to air drag is not entirely a recent idea, though much of the art and results are rather recent. Thirty years ago your speaker assisted in designing the first McKeen rail motor car. The body of this car was streamlined to a marked extent even at that period and all subsequent McKeen cars were streamlined. The coming of the wind tunnel and the aerodynamic laboratory has resulted in a vast amount of practical knowledge in the art of streamlining of aircraft, much of which is applicable to our problem. However, there are certain fundamental differences in streamlining a plane, or dirigible in free flight, and a rail vehicle subject at all times to the effect of ground air drag. Streamlining the exterior of fast moving vehicles has recently been receiving serious attention in the automotive field, as well as by railroads. There are a number of recent examples of streamlined unit cars and trains, both here and abroad, and wherever it has been scientifically applied it has resulted in power reduction at high speeds or has permitted higher speeds with equal power. The application of streamlining is of primary importance when applied to cases where the power supply must be limited, as in oil-electric practice. Reduction of air drag, through careful attention to streamlining, was given extended research in connection with designing the exterior shapes of the Union Pacific high-speed trains. They were, in a sense, born in the wind tunnel. Preliminary scale models of the first train were tested in the University of Michigan wind tunnel under a competent staff. Much of the work was done at 80- or 90-mile air speed in order to secure data corresponding to running speeds. As the tests progressed it was found necessary to reject some preliminary work as assumptions that applied to testing aircraft models were found to need revision where ratio of length to cross section, the element of ground drag and other elements relative to the train model, were somewhat different from aeronautical work. The work consisted of a series of approximations and occupied several months of intensive research.

Air Brake Problems

The problem of arresting 54,000,000 ft.-lb. of energy on the three-car train or 120,000,000 ft.-lb. of energy on the six-car train at 90 m.p.h. in the space of 40 seconds, or about half a mile, brings us to the braking requirements of these high-speed trains. To meet the requirements of making stops from speeds of 90 and even 100 m.p.h. within standard distances, it was necessary to develop an entirely new braking system, which has been successfully accomplished by the New York Air Brake Company. The action of the air brake at these higher speeds had not been explored and was largely a matter of conjecture. Heretofore, uniform brake retardation was not possible due to the fact that the coefficient of friction between brake shoe and wheel varies widely with speed and unit pressure, decreasing rapidly at the higher speeds where it is most needed. While this coefficient may be as high as 25 per cent at very low speeds, it fades out to probably 5 per cent or 6 per cent at 100 m.p.h. While very high percentages of braking power are safe at the higher speeds, they would become dangerous as speed decreased and the coefficient of friction between shoe and wheel gradually increased. A point would be reached where the wheels would lock. It would not be safe to trust the judgment of the enginemen to graduate the cylinder pressure down as speed fell off. In this new brake, in either service or emergency, a very high initial braking percentage is used. The brake cylinder pressure is then automatically controlled, in proportion to speed, by mean of a very simple retardation control principal. If retardation exceeds the safe degree, the braking effect is automatically reduced and the reduction continues until, just before rest, there is just enough air in the brake cylinders to stop the train without lurch or jar. In recent road tests with the first train this brake made service stops from 90 m.p.h. in 2,745 ft. This compares with a service stop of 2,500 to 3,000 feet with the usual steam train brake from 60 m.p.h.

Conclusions

In concluding this paper attention is directed to one factor now existing that will retard more rapid progress, viz. that in order to cross the continent, as illustrated, with only $70.00 worth of fuel it was necessary to make a large investment in the total power plant, consisting of the Diesel engine and the electrical transmission system. The electric transmission is only 80 per cent efficient at the best power output and the losses may run up to 40 per cent or 50 per cent at times. While the manufacturers have supplied a substantial Diesel engine weighing 20 lb. per b. h.p., it is necessary to add 42 lb. per b. h.p. for electrical equipment to transmit the engine power to the wheels. Until the manufacturers of electrical equipment can improve power efficiencies and decrease the weight of electrical equipment the Diesel engine will remain under a handicap to which it is not entitled. While the possibilities are remote at this time, some substitute for the electric drive may be ultimately devised. That is a problem that should be receiving the consideration of those principally involved.

A New Diesel-propelled Streamlined Train.—the "Flying Frankfurter"—will be installed this summer by the German railways on the Frankfort-Berlin run, according to recent reports received by the United States Department of Commerce. The new train, which will be of the type similar to the "Flying Hamburger," will be operated on a schedule requiring an average speed of about 78 miles per hour. At the outset of the new service only one train will be available and this will make the run from Frankfort to Berlin in the early morning, returning in the evening. If the service proves successful additional units of the same type will be installed.

Roper Sees Progress Toward Transportation Co-ordination

WASHINGTON, D. C.

AN optimistic statement as to prospects for a complete policy of transportation co-ordination is given by Daniel C. Roper, Secretary of Commerce, in a foreword to a report just published by the Transportation Division of the Department of Commerce of a survey of "Railway and Highway Transportation Abroad," undertaken by the President's Transportation Committee, of which Secretary Roper is chairman. The statement outlines the activities of various committees that have been appointed, Mr. Roper says, to effectuate the transportation proposals included in Mr. Roosevelt's speech at Salt Lake City on September 17, 1932, including the special committee that drafted the emergency transportation act of 1933 before it was amended at the demand of the railroad labor organizations, and the President's Transportation Committee, appointed after the passage of the emergency act and the appointment of Joseph B. Eastman as federal co-ordinator.

Up to date little has been heard of the President's committee and it is understood that Mr. Eastman's organization has been doing most of the studying, but Mr. Roper's statement connects it with the various legislative proposals that have already been made or adopted and adds that "to the next Congress there will probably be recommended legislation rounding out the President's transportation program fostering an adequate national system of transport." "From these activities," he says, "it would appear that the administration has initiated measures looking forward to the fulfillment of its original pledge for railway rehabilitation, and it is expected that, with the completion during the coming year of the various projects now being studied, the existing transportation structure will be made to conform approximately to the lines of current economic progress, for the general benefit of the carriers themselves and the country as a whole."

After referring to the passage of the emergency act, Mr. Roper continues:

Concurrently with his approval of the Emergency Transportation Act the President requested further research in the transportation field. He wrote: "It is my desire that a comprehensive study be made between now and the convening of the next session of Congress on the transportation situation, including rail, motor bus and truck, air, waterways, and pipe lines in interstate commerce."

To fulfill this duty the President's Transportation Committee was organized, composed of the Secretary of Commerce as chairman; Hon. Clarence C. Dill, chairman Interstate Commerce Committee of the United States Senate; and Hon. Sam Rayburn, chairman Interstate and Foreign Commerce Committee of the House of Representatives, in advisory capacities; and Dr. W. M. W. Splawn, vice chairman; Dr. John Dickinson, Assistant Secretary of Commerce; Jesse Jones, chairman Reconstruction Finance Corporation; Joseph B. Eastman, Federal Coordinator of Transportation; Gen. T. Q. Ashburn, president Inland Waterways Corporation; Frank McManamy, Interstate Commerce Commission; E. B. Collins, representative of the Department of Justice; and Thomas H. MacDonald, Chief, Bureau of Public Roads, Department of Agriculture. This group was concerned with the task of carrying on the work of the previous committees and supplementing the legislative and administrative steps already taken with additional measures, if such seemed advisable. Thus this committee in its regular meetings developed other policies tending to effectuate the administration's program for railway rehabilitation.

Believing that it would be advisable to ascertain the experiences of foreign countries in connection with similar problems, the chairman of the committee directed the Transportation Division of the Bureau of Foreign and Domestic Commerce to undertake a survey for this purpose. This study forms the basis for the report contained in the succeeding pages.

The President on April 20, 1934, designated a committee composed of the Attorney General, the Secretary of Labor, and the Secretary of Commerce to make a study of the railroads' capital structure. This work is now being carried on for the committee by the Federal Coordinator of Transportation.

It will be seen that the committees have been cooperative and helpful in working out with the appropriate congressional committees the legislation which would put into effect the policies outlined by the President in his speech at Salt Lake City and in his messages to the Congress. New railway labor legislation has been enacted for the purpose of settling disputes between carriers and employees and establishing new machinery to replace the old Board of Railway Mediation. Legislation providing for a new railroad pension system has been enacted. Legislation providing for the regulation of competing forms of transport in interstate commerce has been introduced in both the Senate and the House, and also has been recommended by the Interstate Commerce Commission. Existing consolidation plans have been considered and a specific program developed by the Coordinator's staff, which, although it has not been definitely recommended for legislative action, is receiving the attention of the committee. In addition, the Government has aided the railways through the furtherance of Reconstruction Finance Corporation loans and the facilities made available to them by means of Public Works Administration funds.

Introduction by W. Rodney Long

The introduction to the report, a study of existing conditions, recent competitive measures, and co-ordination policies, by W. Rodney Long, begins as follows:

A world-wide movement designed to effect national coordination of land, air, and water transportation is under way. It began on a broad scale less than 3 years ago, but so rapidly has it progressed that today coordination either is being tested or approached in virtually every country of importance which has rail lines.

The plan was recently brought to the forefront in the United States when President Roosevelt communicated to Congress his unqualified indorsement of it. Simultaneously, a detailed program for coordination of all land, water, and air services within the Nation was submitted by Transportation Coordinator Eastman.

Most sponsors of the movement insist that only through coordination can an oversupply of service, with consequent losses to owners, operators, and users, be avoided. Too much service in many places, they contend, has been detrimental to transportation. Adjustment of services to the actual needs of users, by scrapping, coordination, and strengthening, is vital, they insist. If all of these steps cannot be taken, it is further urged, at least all forms of transit should be placed under common regulation.

Not all those behind the movement take this broad view, however. Many frankly urge legislation designed solely to protect rail lines against competition. This position has been particularly evident in countries where rail lines are government-owned.

Much opposition to coordination sprang from those interested in highway, air, and water carriers. Among highway and air carriers, particularly, there is in some instances the contention that their services are meeting new public requirements and that for the present they should not be subjected to regulation, especially as to rates. Many water carriers insist that they act as protectors to shippers against alleged exorbitant rates by rail carriers and, therefore, should be permitted to operate without restrictions as to rates and regulations.

In almost all countries outside of the United States, the majority of rail lines are state-owned and often state-operated. Naturally in such situations government officials have exerted strong efforts to aid them by coordinating measures. Also being in a favorable position to enforce such legislation, they have obtained results which might not have been so successful under other conditions. Coordination movements, however, are not confined wholly to countries where rail properties are publicly owned. Canada, which has both publicly and privately owned rail lines, has empowered its Board of Railway Commissioners to meet competition from highway carriers through tariff changes.

Coordination has had its most extended test and proved most successful in Germany. In an address before a Road Congress in Munich in September, 1934, Reichsminster Hess declared that, as a result of the working out of legislation in effect for several years, the problem of transit coordination had practically ceased to exist. The grouping of representatives of all forms of transportation under a Federal Trade Council, as well as the building of arterial highways, brought encouraging results.

Improved conditions of the New Zealand railways also are

attributed to the successful operation of a transit licensing plan put into effect under the supervision of a Transport Coordination Board. Railway revenues from both passenger and freight traffic have increased. Gross revenue increased during the year ended March 31, 1934, for the first time since 1929.

Here follows a resume showing how coordination is progressing in virtually every country in the world which has rail lines outside of the United States. The total rail mileage represented in these summaries is between 275,000 and 300,000. Details of the movements in different countries are dealt with more extensively in other parts of this report.

Pelley Finds Co-ordinator No Longer Needed

WASHINGTON, D. C.

"SINCE the railroads have established an authoritative organization to manage their own affairs within the industry, the office of federal co-ordinator is no longer needed," said J. J. Pelley, president of the Association of American Railroads, in a radio address over the Columbia Broadcasting System on March 7. Furthermore, he said, "the railroads object to the idea of a federal co-ordinator with power to exercise authority without responsibility in the domain of management." Mr. Pelley also urged the enactment of the bills prepared by Mr. Eastman for the regulation of highway and motor transportation and opposed the bills introduced in Congress at the instance of the railroad labor organizations.

"All we ask," Mr. Pelley said, "is that Congress and the state legislatures give us equality of opportunity in the field of competition with other forms of transportation and also prevent the enactment of burdensome legislation. Given these things, the rising tide of prosperity will find the railroads again on a sure foundation and contributing to increased prosperity through a volume of purchases probably unequalled by any other single industry."

A. A. R. Has Broad Powers

Mr. Pelley explained that the board of directors of the association has authority to assume jurisdiction not only of disputes among carriers but "to do everything for the industry and the general public interest that can be done within the industry itself," saying, "it is a bold experiment in co-operation in the face of a critical situation. While it makes no sensational bid for popularity, and will enter upon no course of action merely for the notoriety it may thereby secure, it expects to proceed with due care, and along lines approved by experience and common sense, yet it is alive to the necessity for constructive action in line with modern thought, however great may be the departure from precedent." Mr. Pelley also said:

We are being told constantly that the railroads are in a bad way; that more miles of road are in bankruptcy than ever before; that they are heavy borrowers from the government and that they are not earning rentals and interest on the money they have borrowed. It can not be denied that the condition of the railroad industry, in common with many other forms of business, is far from satisfactory. The railroads have suffered from the depression, yes. Their gross receipts have been cut in half. And yet, they have managed by a remarkable display of skill to reduce their operating expenses in the same proportion that their revenues have decreased, without impairing the efficiency of the service. Indeed, they have speeded up their trains, rendered them more comfortable by air-cooling, expanded their program of electrification and installed at considerable cost new stream-lined, light-weight passenger trains to promote speed and economy. Railroad management is justly proud of the record of the rails during the greatest business depression in history. True, we have borrowed from the government. But all these loans are well secured and will be paid promptly with the return of normal conditions, just as more than twice the sum now due was repaid to the government after the period of federal control.

Regulation Has Gone Near to Limit

But the depression is not the only source of railroad difficulties. We are dealing with a business affected with the public interest, which, under our political system, the government has the right to regulate for the public good. In the case of the railroads, public regulation has gone very nearly to the limit. Our rates are fixed by the Interstate Commerce Commission: this determines our income. The wages of our employees, if not fixed by agreement between the parties interested, are subject to review by government boards, and the prices we pay for materials and supplies are influenced by codes under government direction. These two items largely determine our expenses. We pay good wages, observe decent hours of labor, and take every precaution for the safety of patrons and employees.

In recent years, as we all know, there has been a tremendous increase in highway and waterway traffic, at the expense of the railroads. Of this we have no right to complain, if the conditions of competition are fair. No one for a moment questions the right of the American people to use that form of transportation which is most economical and best suited to their needs. But when we remember that in normal times probably seven million people look to the railroad payrolls for direct support; that more than four billion dollars of railroad securities are owned by savings banks, life insurance companies and like institutions in the welfare of which probably forty per cent of our people are interested, we catch a glimpse of the importance of the subject, and the necessity for fair treatment in regulation.

The railroads furnish and maintain their own roadway and, in normal times, pay nearly a million dollars a day in taxes, all of which goes to the general purpose of government. Out of every dollar taken in by the railroads, 34 cents is paid out for taxes and for interest on the investment in and maintenance of the roadbed. The buses and trucks, according to reports of such state regulatory commissions as maintain records, pay less than 10 cents out of every dollar they collect for taxes and the right to use the public highways.

This gives us some idea of the advantages enjoyed by trucks in having the use of our splendid highways built and maintained at public expense. The commercial water carriers are favored to an equal if not greater extent, enjoying as they do the free use of waterways upon the improvement of which the taxpayers have poured out their money. When we are told that highway and waterway transport is cheaper than rail, are we not forgetting that the average citizen is paying out in taxes for the benefit of highway and waterway operators more than he is saving in freight charges?

Trucks Enjoy Rate-Making Freedom

I am sure that all my hearers understand that the railroads can not bargain for traffic. They are required by law to establish their rates by filing them with the Interstate Commerce Commission and when so filed these

rates have all the force and effect of law. They can not change these rates except upon 30 days' notice, unless the commission, by special permission, permits a shorter notice. Furthermore, the commission may prohibit changes in rates and this power it often exercises. But the trucks in the case of interstate traffic, a substantial part of the whole, may make what rates they please by special contract and independent of all control. In this way, they can skim the cream of the traffic while the railroad looks helplessly on.

Code Regulation Ineffective

Again, except for such restrictions as are supplied by the codes, many of the trucks pay such wages and observe such hours of labor as they choose. You are as well qualified as I to say whether code regulation is effective.

The railroads, on the other hand, are governed by law as to hours of service and by agreement with organized labor as to wage scales, which have almost, if not quite, the force and effect of law. What is true of traffic on the highway is equally true of water transport. No extended argument is necessary to convince you that these conditions do not make for fair, open and equal competition. It must be obvious also, that there can be no test of what form of transportation in a given case is really most economical until there is equality of opportunity, and until all hidden costs are brought to the surface.

There are pending now in Congress two bills which, in the public interest, should promptly be enacted into law. One is a bill to regulate commercial highway transport and the other is a bill to regulate commercial haulage by water. Both were prepared by the Federal Coordinator of Transportation, Mr. Eastman, and both have been strongly approved by the Interstate Commerce Commission. This regulation is advocated by the state public utility commissions, the United States Chamber of Commerce, the Transportation Conference, the organized railroad workers, a majority of common carrier operators on land and water, and a large portion of the shipping public. I make an earnest appeal to my radio listeners that you make your influence felt for these wholesome measures.

Prospective Burden of Rail Labor Bills

There have also been introduced in this session of Congress, at the instance of railroad labor leaders, bills to make six hours, with eight hours' pay, the standard day for railroad labor, to limit the length of trains and add to the number of men required on certain classes of trains, and other measures, all of which would add to the expense of operation of the railroads in excess of one billion dollars per year. These measures would have the effect of adding only to the expense—nothing whatever to the safety or efficiency of operation. The railroads could not pay such a bill of increased costs and the traffic of the country should not be called upon to bear any such burden.

In June, 1933, Congress enacted the Emergency Transportation Act, administered by a Co-ordinator, sounding an emphatic note in favor of economy through coordination and consolidation of service. The law specifically provides that the number of employees in the service shall not be reduced below the number in service during May, 1933, nor shall any employee be in a worse position as to compensation than in May, 1933, by reason of any action taken under the co-ordinator act. Largely on account of these provisions, the results under the law have been disappointing.

Odds and Ends . . .

A Real Railroad Enthusiast

Six miles of railway, complete with rails, fastenings and ties was stolen in Poland recently, according to foreign dispatches. Ah, well, the holiday season was approaching and some fond fathers will do anything to provide adequate Christmas gifts for their sons.

Forced Landing

Railway stock cars have been used for many purposes, but it remained for Pilot Jasper Jones, of Menard, Texas, to use one as a landing field. This took place at Sonora, Texas, on the Pan Handle & Santa Fe recently. Both the airplane and the stock car are considerably the worse for wear, but the pilot and his two passengers were uninjured.

The Strange Plight of Carbon, Ind.

When the wind blows from the northwest, residents of Carbon and adjacent rural routes do not get their mail until after a day's delay. There have been so many northwest winds this winter that there is much complaining. Investigations reveal that the Carbon mail usually is thrown off at the station from a fast train. When the wind is from the northwest the locomotive smoke is blown down through the mail coach's open door. The railway mail clerks cannot see the town of Carbon. Rather than drop the mail sack into the open country, those clerks carry it through to Terre Haute, whence it returns the following day.

Champion Commuter Dies

When Attorney Wilson D. Crabb died at his home in Smithfield, Ky., recently, the Louisville & Nashville lost a patron whose record as a commuter probably stands alone. Almost daily for the past 35 years "Judge" Crabb, as he was affectionately known to the trainmen, commuted between Smithfield, where he lived, and Louisville, where he practiced law. In making the 80-mile round trip Mr. Crabb spent about three hours on the train. It is estimated that in his 35 years of commuting he traveled more than 800,000 miles and consumed more than 1,300 days of 24 hours doing it. In commuter fares he paid the company about $7,000.

World's Largest Bridge Opened

On January 14, the first passenger train passed over the newly completed Lower Zambezi bridge, which is now called the longest bridge in the world. The Zambezi bridge took 3½ years to build, and cost approximately $10,000,000. It is the last link in the chain which provides Nyasaland and Portuguese East Africa with an unbroken railway transportation route from Lake Nyasa to the port of Beira, a distance of 520 miles.

The total length of the bridge is 12,064 ft., 1,537 ft. longer than the Tay bridge, and 3,764 ft. longer than the Forth bridge. The 33 main spans rest on concrete piers sunk 120 ft. below the surface of the river, and as river steamers will continue to ply between Chinde at the mouth of the Zambezi and Tete, above the bridge, the clearance for navigation at maximum high flood level is 27 ft. The bridge carries a single railway track and a pedestrian footpath, but no motor road is included. The bridge was built by the Cleveland Bridge Company, of Darlington, England, which built the Victoria Falls bridge.

It has been said that the construction of railways in Central and East Africa has cost a life a tie. The Cleveland Bridge Company, when embarking upon its contract, determined to do everything possible to maintain health. The construction camp was declared a closed area, and within it most rigorous measures were introduced and maintained for combating the mosquito and the fly. Thus, at the end of nearly four years, there has been practically no sickness among the 6,000 native employees, and among the European staff, young men brought direct from England, there has not been a single case of malaria. This on the very bank of the Zambezi, notorious for the toll of life it has taken with malaria and blackwater.—*London Times.*

NEWS

Railway Net for January a Return of 1.5 Per Cent

Compares with 2.16 per cent return for corresponding month of last year

The net railway operating income of the Class I railroads in January amounted to $21,348,557, which for that month was at the annual rate of return of 1.50 per cent on their property investment, according to reports filed by the carriers with the Bureau of Railway Economics of the Association of American Railroads. In January, 1934, their net railway operating income amounted to $31,058,275 or 2.16 per cent. Operating revenues for January amounted to $264,213,172 compared with $258,014,517 in January, 1934, or an increase of 2.4 per cent. Operating expenses totaled $212,971,508, compared with $195,866,222 in the same month last year, or an increase of 8.7 per cent. Class I railroads in January paid $19,868,948 in taxes, a decrease of $766,326 or 3.7 per cent under the same month last year.

Sixty-one Class I railroads operated at a deficit in January, of which 13 were in the Eastern district, 15 in the Southern and 33 in the Western.

The net railway operating income in the Eastern district in January was $19,309,156, at the rate of 2.84 per cent. For the same month in 1934, their net was $21,267,623 or 3.11 per cent. Operating revenues in the Eastern district in January totaled $140,289,062, an increase of 3.6 per cent over the corresponding period the year before, while operating expenses totaled $106,217,477, an increase of 7.4 per cent.

Class I railroads in the Southern district in January had a net of $2,756,082, at the rate of 1.12 per cent. For the same month in 1934, their net amounted to $5,272,361, at the rate of 2.11 per cent. Operating revenues in the Southern district in January totaled $34,354,140, a decrease of 0.7 per cent under the same month in 1934, while operating expenses totaled $28,296,959, which was an increase of 9.7 per cent.

Class I railroads in the Western district in January had a net railway operating deficit amounting to $716,681. In January, 1934, their net railway operating income amounted to $4,518,291, at the rate of 0.89 per cent. Operating revenues in the Western district in January totaled $89,569,970, an increase of 1.8 per cent above January, 1934, while operating expenses totaled $78,457,072, an increase of 10.3 per cent.

CLASS I RAILROADS—UNITED STATES
Month of January

	1935	1934	Per Cent Increase
Total operating revenues	$264,213,172	$258,014,517	2.4
Total operating expenses	212,971,508	195,866,222	8.7
Taxes	19,868,948	20,635,274	3.7 Dec.
Net railway operating income	21,348,557	31,058,275	31.3 Dec.
Operating ratio—per cent	80.61	75.91	..
Rate of return on property investment—per cent	1.50	2.16	..

Colton Heads Traffic Club of Baltimore

R. C. Colton, traffic agent for the Western Electric Company, became president of the Traffic Club of Baltimore at the club's twenty-second annual President's Dinner and Inaugural Ball, held on March 5 at the Lord Baltimore Hotel, Baltimore, Md. Other officers elected for the ensuing year are: First vice-president, T. E. Riley, district manager, Export Steamship Lines; second vice-president, G. E. C. Garrett, passenger representative, Pennsylvania; treasurer, J. H. Bell, freight representative, Southern; secretary, C. F. Johnston, secretary, Locks Insulator Company.

Billion Dollar Burden Threatened by Labor Bills

The Association of American Railroads has issued a statement saying that passage of the program of legislation being pressed in this Congress by the executives of the railway labor organizations would increase the operating expenses of railroads by considerably more than one billion dollars a year, without adding anything to the service, safety, efficiency or revenues of railroads.

"The $597,000,000 a year that would be added to railroad expenses by the six-hour day bill alone," the association points out, "is more than the entire amount of interest paid by the railroads on their total funded and unfunded debt. The total added cost from passage of all the bills would be more than $1,000,000,000 a year. How could the railroads, under today's conditions, carry such a burden? Passage of such bills would mean the collapse of the railroads, with the most serious consequences to those who work for them, the shippers who use them, and those who have money invested in them. The issue is now before the Congress of United States."

Final Hearings on Motor Carrier Regulatory Bill

Concluding sessions held this week by Senate committee and House sub-committee

Hearings on the bill recommended by Co-ordinator Eastman to provide for federal regulation of motor carriers were concluded this week before the Senate committee on interstate commerce and a sub-committee of the House committee on interstate and foreign commerce, with testimony by representatives of the carriers concerned, the shippers, and railroad labor organizations. Most of the witnesses who have appeared have favored regulation of truck and bus transportation but comparatively few have not objected to many features of the bill on the ground that they are unduly restrictive or difficult to enforce. Representatives of the trucking industry have urged the need for regulation to bring about stability in rates but have asked that the legislation be framed to place the emphasis on "self-regulation" through code authorities, subject to "supervision" by the Interstate Commerce Commission. Testimony of shippers has taken a wide range as to the degree of regulation desired.

The Senate committee expected to take up on March 11 the water carrier bill, but Senator Copeland, chairman of the commerce committee, has made a request that the bill be referred to his committee.

Senator Wheeler said he would invite members of the other committee to participate in the hearings before his committee.

The members of the Congressional committees who have asked the most questions during the hearing have shown little enthusiasm for the bill. Although some of them seem to recognize the need for some regulation of motor transportation the general attitude appears to be in opposition to placing many restrictions on the large number of individuals who operate their own trucks or to regulation which would cause them to increase their rates, although representatives of the truckers have testified that rate-cutting and "chiselling" are the chief problems of the industry.

The fact that Mr. Eastman's findings as to the extent to which highway and water transportation are subsidized have been delayed has left the hearings to be conducted in an atmosphere which makes it possible for members of Congress to treat the proposed legislation as an effort to interfere with "cheap" transportation.

Senator Wheeler said at one point that

(Continued on page 371)

More Railroad Resistance Than Help, Says Eastman

Co-ordinator finds them more zealous to prove that conclusions of his staff are wrong

In an address before the Chamber of Commerce of the State of New York on March 7, Joseph B. Eastman, federal co-ordinator of transportation said that the railroads had seemed to him more zealous to prove that his staff was wrong in its conclusions and recommendations than to find, with the help of their reports, ways and means of improvement, and that "their attitude, in short has been one of defense." He said the railroads had co-operated in making the inquiries but that when it came to utilizing the results the situation was different and that "from the beginning there has been a feeling of pulling against dead weight or even against active resistance." Differences of opinion were to be expected, he said, "but not a wholly negative response. Yet we have had much more of the negative than of the affirmative." Referring to the proposal for the handling of merchandise traffic he said, "they will have none of it but offer nothing in its place," and as to the passenger traffic report, "while there has been no sufficient time as yet for a formal response to our report, the reaction which we have had from the railroads has generally been one of resentment." As to some other proposals he said, "we have had more resistance than help from the railroads," and while he indicated a hope that the Association of American Railroads may bring about a change he said that "whether the leadership for such policies, and especially for the necessary co-operation, exists in the industry remains to be seen."

After outlining his legislative program, Mr. Eastman said that if the railroads and other transportation agencies are to remain in private hands, "I am able to propose no other program for their successful future operation than the one which I have outlined to you. If this effort fails, then I see no escape from the conclusion that the federal government must assume more direct and immediate responsibility for the functioning of our transportation system. If the railroad managements and their conservative business friends wish to avoid this contingency, they must act boldly and aggressively and with the degree of enterprise and initiative that the hope of private profit is commonly supposed to inspire."

Mr. Eastman said that one very real ground of objection to public regulation has been neglected. "The tendency of regulation is not only to divert the attention *of* management but also to divert attention *from* management. Those who are financially interested in the railroads and constitute the private ownership concentrate their attention on Washington. That is where, they are led to believe, the railroad devil resides. If anything goes wrong with the railroads, it is because Washington has been misbehaving, and they come to think of railroad salvation in terms of rate increases.

"It is very desirable that Washington should operate in the limelight, and I do not object even to the searchlight. We need attention. Nevertheless I suggest that it is not well to forget that the railroad industry is subject to the same maladies as attack other forms of business and to the same natural laws. It may not be amiss, now and then, to look for ills elsewhere than in public regulation. There may have been, here and there, a deficiency in enterprise and initiative, a failure to recognize and meet new conditions, too much unwise competition, too great expenditures on grandiose projects, or an absence of sound commercial sense in the pricing and marketing of the products. If there were no regulation, that is where the trouble-hunter would look. I suggest that regulation does not remove the need for such search."

Western Grain Rates Postponed

On the ground that the railroads are physically unable to comply by April 1 with its order of October 22, 1934, prescribing a revision of western grain rates the Interstate Commerce Commission has postponed the effective date until June 1.

Pacific Northwest Shippers' Board

The Pacific Northwest shippers' advisory board will hold its spring meeting in Portland, Oregon, on March 22. C. S. Duncan, economist for the Association of American Railroads will be the principal speaker while C. H. Deitrich, executive vice chairman of the Freight Claim division of the association will speak on freight claim prevention.

Terms of Interstate Commerce Commissioners

The House on March 4 passed the bill recommended by the Interstate Commerce Commission providing that upon the expiration of his term a commissioner shall continue to serve until his successor is qualified but not beyond the end of the next regular session of Congress, nor, if his successor is not nominated by the 15th day of such regular session, after such 15th day.

Traffic on "400" Gains in February

Carrying an average daily load of 336 passengers for the north and southbound trips combined, the Chicago & North Western's "400" exceeded in its second month of operation the daily average of the first month by 20 passengers per day on its round trips between Chicago and the Twin Cities. The total for February was 9,356 passengers, which fell only 120 short of the January total of 9,478, although January had two more operating days. The total for the two months is 18,834. The record day was February 21, when 513 passengers were carried. During February 5,530 meals were served in the dining cars, as compared with 5,921 meals in January.

On March 3 a lounge car containing a lounge section and a 14-seat parlor section was added to the train to replace one of the coaches, due to the demand for parlor car seats. If the demand for coach seats should increase, the train will be increased to seven cars.

Coal Industry Regulation Opposed by the Railroads

Duncan makes statement on pending bill before Senate interstate commerce committee

Enactment of the bill introduced by Senator Guffey of Pennsylvania for the regulation of the bituminous coal industry was opposed on behalf of the railroads in a statement to the Senate interstate commerce committee on February 28 by Dr. C. S. Duncan, economist of the Association of American Railroads. He charged that the bill is not in the public interest, that it will increase the cost of coal to consumers and enable the bituminous coal industry "under the cloak of an industry affected with public interest" to escape from the anti-trust law and "consolidate monopolistic powers." Dr. Duncan told the committee that the railroads are opposed to the bill on the following grounds:

"It extends the power of regulation, by an industry-controlled organization, to railroad captive mines, which are in the nature of plant facilities, and unnecessarily and unjustifiably and contrary to the best interests of an essential public utility so as to interfere with the most efficient and economical operation of such mines.

"It would increase railroad operating costs. A partisan regulatory body is provided for which will dictate to rail carriers at what price they may secure their coal.

"This regulatory body would also have the power, and is directed to exercise it, to dictate to a very large extent at which mines the rail carriers may secure their coal. This would take from the railroad management its right to purchase this commodity without artificial restrictions, a freedom which the carriers have with respect to all other commodities, and a freedom which is essential to their economical and efficient operation.

"Substitutes for bituminous coal have for years been crowding it in all markets. The provisions of this bill would give them new impetus. As carriers of coal the railroads would further suffer a decline in tonnage and revenues.

"The bill provides that the consumers of coal shall carry the burden of expense, through taxation, of the rehabilitation of the bituminous industry, validating investments whether wise or unwise, caring for displaced and unemployed miners, and otherwise transferring managerial and labor leader's responsibility from the industry itself.

"In its entire conception the bill is inconsistent with the responsibilities of a public utility and the regulation of such a public service industry in the public interest.

"So vital," said Dr. Duncan, "is coal to the operation of a railroad that, despite all difficulties, complexities and obstacles in the way, a carrier must be assured of a continuous supply. Any interference in the fields of purchase of fuel supplies, which have been carefully selected by the railroads, could result in nothing but an interruption to the present efficient and economical railroad operation. It is not be-

lieved that the shippers of the country would willingly see legislative action taken which would imperil in any way the high standard of transportation service which is now being rendered them, nor would they support legislative action which would unnecessarily increase the operating expenses of the rail carriers and call for increased rates. The railroads obviously want to see the bituminous coal industry revived; they want to see it prosper; they want coal to move by rail in ever increasing volume."

Dr. Duncan estimated that the bill would bring about an increase of from seven to ten million dollars per year in the fuel bill of the railroads "and thus compel an industry which itself has an important unemployment problem to aid in the financing of the unemployment and rehabilitation problem of an independent industry."

Referring to the provision in the bill authorizing the National Bituminous Coal Commission to pass upon the extension of railroad facilities for the service of any mine producing bituminous coal, Dr. Duncan said, that "this is an attempt to remove from the Interstate Commerce Commission that has the responsibility for regulating rail carriers both as to rates and service, a duty which belongs to them and to them alone." If such a provision is to be required, he said, it also should be made applicable both to waterway and highway transportation.

"There is," continued Dr. Duncan, "a further consideration which experience has shown the rail carriers. Regulation of an industry does not secure stability within that industry or provide anything other than a strait-jacket, unless and until corresponding regulations are applied to competitive substitutes. The bituminous coal industry might take warning from this experience. It seems inevitable that the plan devised by this bill for giving the bituminous coal industry monopolistic powers under the guise of regulation will prove to be a bitter disappointment unless the regulatory powers are administered in the public interest and even then unless corresponding regulations are applied to their competitive substitutes."

Shipping Board Bureau to Consider Seatrain Authorization

The Shipping Board Bureau of the Department of Commerce has announced a hearing to be held at Washington on March 20 on the application of Seatrain Lines, Inc., that it make permanent the temporary authority heretofore granted to it to carry on coastwise trade between New York and New Orleans via Havana. The hearing is to afford interested parties an opportunity to show cause, if any, why the application should not be granted.

Light For Railway Service

An analysis of experiments under way throughout the country for lighting railway coaches will be presented by Alvin L. Powell, president, Illuminating Engineering Society, at the meeting of the New York Railroad Club, to be held March 15, at 7:45 p.m., in the Engineering Societies Building, 29 West Thirty-ninth street, New York City. The speaker will be introduced by Samuel G. Hibben, director of Applied Lighting Westinghouse Lamp Company. The subject of Mr. Powell's presentation is "Artificial Light—the Engineer's Greatest Gift to Mankind." It will consist of a spectacular demonstration of modern forms of electric lighting, and will also deal specifically with railroad requirements.

The presentation is being made through the co-operation of the following manufacturers: General Electric Company, Westinghouse Company, Kliegel Bros., National Carbon Company, Claude Neon Company and others.

N.I.T.L. Executive Committee Opposes Many of Eastman's Proposals

A position in opposition to the continuance of the federal co-ordinator of transportation beyond the time limit of the present law, June 16, was taken by the executive committee of the National Industrial Traffic League at a meeting in Washington on March 5, held to consider the attitude to be taken before Congressional committees on various features of the Eastman legislative program. It was the view of the committee that many of the functions of the co-ordinator can be performed by the Interstate Commerce Commission but it did not favor giving the commission additional powers for the purpose of requiring co-ordination, on the ground that the Association of American Railroads should be given an opportunity to carry out the purposes of that organization as they have been announced. The position of the committee was expressed in the form of revisions of a report of the legislative committee.

In the event federal regulation of the rates and services of unregulated transportation agencies shall be undertaken the committee recommends that such regulation be administered by distinct divisions of the Interstate Commerce Commission, proposing that where cases arise involving more than one of such agencies the divisions affected shall create a special division composed of members of each to dispose of them. It is proposed that the chairmen elected by the three divisions shall constitute a general policy board whose jurisdiction could be invoked by any of the divisions but not by litigants. The committee particularly opposed the Eastman plan for a permanent chairman, appointed by the President, and for a control board.

The committee also expressed opposition to the dismissal compensation, six-hour day, train limit, and full-crew bills, and others proposed by the labor organizations.

Proposed Transport Legislation

The bill recommended by Co-ordinator Eastman in his report of January 30 to amend the bankruptcy law in relation to railroad reorganizations has been introduced in the House by Representative Sumners, of Texas, chairman of the judiciary committee, and referred to a subcommittee. As introduced the bill includes some changes from the form included in Mr. Eastman's report, as a result of discussions with Mr. Eastman and his staff. Whereas the original draft had provided that a plan of reorganization should provide for a reduction of fixed charges to an amount not in excess of 80 per cent of the average income available for that purpose during the worst three consecutive years of the ten-year period preceding passage of the act, the bill as introduced provides for the reduction of the fixed charges to such an amount that, "after due consideration of the probable and prospective earnings of the property in the light of its recent earning experience and other relevant facts, there shall be adequate coverage of such fixed charges by the probable earnings available for the payment thereof." Another change provides for consent to a reorganization plan by creditors representing two-thirds of the amount of the claims instead of 50 per cent.

The Senate appropriations committee, to which the President's $4,000,000,000 work-relief resolution was re-committed on February 22, reported the resolution back to the Senate on March 5 in revised form, including a provision "ear-marking" in a general way some of the principal groups of projects to be covered. This provides that not to exceed $800,000,000 shall be available for highways, roads, streets and grade crossing elimination but there is also a provision allowing the President to exceed the amounts named by 20 per cent.

The Senate committee on interstate commerce has referred to a sub-committee the various bills proposed by the Railway Labor Executives' Association, including the six-hour day, full-crew, and train-limit bills.

Assails High-Pressure Political Methods of Labor Leaders

Blaming "rigid, oppressive" government regulation and labor's increasing political domination for the present financial crisis confronting the railroads, Milton W. Harrison, president of the Security Owners Association, speaking before the Minneapolis Traffic Club on February 28, warned that only prompt Congressional action could prevent a credit collapse which might eventuate in government ownership.

Liberalization of the Government's lending policy to railroads, creation of an equipment corporation to aid in rehabilitating railroad motive power and rolling stock, together with the launching of a program of consolidations, were urged by Mr. Harrison as remedies for the transportation emergency.

"A combination of the influences of depression, rigid regulatory policy, labor domination and unregulated competition, has resulted in a collapse of railroad credit," Mr. Harrison declared. "Government ownership is thus more likely to arrive by the back door instead of the front, without any real sentiment in favor of such a policy having been shown by the public."

Condemning labor bills recently introduced into Congress for the six-hour day, limiting train length, hours of service and other measures, Mr. Harrison said:

"Ever since 1916, the railroad labor unions, through their control of more than a million and a half member voters, concentrated for the most part in strategic Congressional districts, have exercised increasing power over the national legislature.

"No one questions railroad labor's right

to a high wage commensurate with the skill required or what revenues are able to bear. But such a proposition is quite different from utilizing the power of the state, through organized political pressure, to exact tribute over and beyond the capacity of the railroads to pay, when such acts unbalance and endanger the whole existing economy.

"When politics is injected into the relations between management and labor, there can be only one outcome. Cooperation in the solution of common problems becomes virtually impossible; antagonism and distrust replaces that harmony and understanding which should prevail among men who spend practically their entire lives shoulder to shoulder in the same enterprise.

"For the situation that has developed on the railroads, management must accept its share of responsibility. The autocratic tradition, understandable in an industry which must maintain almost military discipline in order to move trains on split-second schedules, has outlived its usefulness. Management has been slow to sense that new times require new methods. Lacking the proper perspective, it has often played directly into the hands of labor politicians and been forced in the end to yield much more than if a more reasonable, conciliatory course had been pursued."

Discussing financial needs of the railroads Mr. Harrison declared:

"For the industry as a whole the principal factor is under-maintenance of the properties and the gradual deterioration of rolling stock and equipment during the six years of depression. With the present low levels of traffic, this may not be of serious consequence; but with any revival in business, the railroad plant must be restored quickly to an efficient operating basis. This will require expenditure of large sums of capital, which can be obtained only in part from increased traffic revenues.

"Provision of some temporary financing, as a bridge-over to a restored earning-power, would thus seem a necessity. With the present impairment of railroad credit, it would appear that only the government, through the Reconstruction Finance Corporation, could supply these needs. Precedent exists for such action in the course taken in 1919 when the government, after war-time operation, relinquished control of the railroads.

"With regard to companies facing possible reorganization, national policy must be defined with extreme care. Railroads, which have had a deficiency of not more than 20 per cent in meeting their fixed charges during the acute phases of the depression, should not be allowed to become bankrupt. The deflationary forces thus set in motion would do much to offset progress toward recovery made during the past year. A way must be found to meet this emergency without general recourse to the bankruptcy court. Some common program of action must be agreed upon, fair to equity holders as well as to bond holders, which will prevent any widespread break-down in railroad finance. We must overcome the present attitude of 'defeatism' by bringing to bear constructive remedies for this temporary situation."

Final Hearings on Motor Carrier Regulatory Bill

(Continued from page 368)

there was quite a decided feeling among members of Congress that there should be no regulation of motor vehicle transportation on the ground that it is a new industry but that his own view was that something should be done by Congress to provide a start toward regulation and enable the commission to study the problem.

R. V. Fletcher, general counsel of the Association of American Railroads, appeared before the Senate committee on March 5, making a statement similar to that he had made before the House committee.

E. S. Brashears, general counsel of the American Trucking Associations, attempted to describe before the Senate committee the methods of operation under the truck code, as he had before the House committee, but Senator Wheeler cut this part of his testimony short, saying he thought it entirely impractical to write the code provisions into the proposed legislation. Mr. Brashears said the position of the association was that the I.C.C. should be enlarged and divided into divisions as proposed by Co-ordinator Eastman; that there should be an officer similar to the co-ordinator to act as administrator under the code; that provision should be made for establishment of actual rates by agreement and approval by the I.C.C. which would become the mandatory rates, and that in the absence of mandatory rates no member should be allowed to charge less than cost; that provision should be made for registration as under the code; and that the supervision of the co-ordinator should be extended to rates and the election of code authorities.

When Mr. Brashears pointed out that the code provides for an average of 48 hours a week for labor, with no daily limitation, except as provided by state law, Senator Wheeler said there ought to be some limitation on hours in the interest of public safety. Mr. Brashears said that the principal weakness of the code and the gravest problem of the industry was the absence of provision for rate-fixing, although the code requires the filing of minimum rates with state code authorities and contains a provision prohibiting charges less than the cost of service as determined by a cost formula. He said there had been many complaints from shippers, from within the industry, and from competing carriers because of the inadequacy and instability of rates and that the industry feels that, subject to proper supervision, there ought to be rates established by agreement. He said that a large number of the smaller operators do not know their costs and that they make reduced rates which may be met by the railroads and thus force down rates charged by other operators; also that the common-carrier operators who have to operate over routes whether they have sufficient business or not have even greater difficulty in determining their costs. However, he said, he was amazed that any one should expect any successful enforcement from the bill as set up and he predicted that without proper enforcement its restrictions would create more "bootleggers" of transportation than there were of liquor.

L. F. Orr, chairman of the highway transportation committee of the National Industrial Traffic League, said that his organization, by a slight majority, had favored "reasonable and logical regulation of highway transportation," but that the co-ordinator's recommendations as expressed in the bill do not insure fair treatment to the users of motor transport.

Leonard Sims, manager of the transportation department of the Detroit Board of Commerce, opposed regulation of contract carriers.

George M. Harrison, acting chairman of the Railway Labor Executives' Association, advocated the regulation of carriers competing with the railroads but accused the railroads of competing with themselves by co-operation with forwarding companies and through their interests in bus and truck operations. He said the most effective form of regulation of motor transportation would be to compel adequate wages, reasonable hours of service, and adequate safety standards, and he urged that the bill be amended by adding the collective bargaining provisions of the labor act and provisions similar to those of the hours of service act.

J. A. Farquharson, legislative representative of the Brotherhood of Railroad Trainmen, urged the necessity for regulating the competitors of the railroads and for regulating hours of service of truck drivers.

Charles E. Blaine, traffic counsel for the American National Livestock Association, the National Wool Growers' Association, and others, advocated "reasonable" regulation of motor vehicles but opposed most of the detail provisions of the bill and said that in many of the states that now regulate truck rates they are prescribed on the basis of rail rates or after taking rail rates into consideration. Such a bill, he said, would simply drive the large shippers to operate their own trucks. He recommended that the I.C.C. be required to adjust rail rates in relation to costs and be given jurisdiction over trucks so that it can make a study of truck costs.

Walter R. Scott, secretary and transportation commissioner of the Kansas City Board of Trade, who said he spoke for the grain trade in the Southwest, favored the entire bill, saying that the competitors of the railroads should be subjected to comparable regulation because the growing competition is of an unhealthy and demoralizing character. He described the practice by which itinerant truckers buy grain from the farmers and by trucking it to a more distant market cut down the business of the country elevator and depress the regular market. This, he said, increases the costs of the country elevators and may put some of them out of business.

Complete objection to the bill was expressed by Fred Brenckmann, representing the National Grange, W. S. Camfield, of the Eastern Apple Growers' Council, and E. H. Everson, of the Farmers' Educational and Co-operative Union.

Clark Drury, chairman of the trucking committee of the American Fruit and Vegetable Shippers' Association, favored

federal regulation of highway motor carriers but asked that the itinerant truck peddler be included in the plan.

J. L. Keeshin, president of the National Highway Freight Association, said that his organization, of common carrier truck operators, was wholly in favor of the Eastman bill. He said the idea of continuation of code regulation had its origin in the fact that "many of the boys" were doing better in code authority positions than they had in the trucking business. George F. Whitehead, representing the Arrow Carrier Corporation and others, said that about 90 per cent of the responsible truck operators want federal regulation. J. R. Van Arnum, for the National League of Wholesale Fruit and Vegetable Shippers, favored the Eastman bill, with an amendment, and spoke particularly of the effect of the operations of itinerant truckers on the fruit and vegetable industry. Kit F. Clardy, former member of the Michigan commission, appearing for truck operators, said the essentials of the Eastman bill are required and that the N.R.A. code had resulted in a "flop." Carl Giessow, director of the traffic bureau of the St. Louis Chamber of Commerce, favored the Eastman bill but said it should be considered in connection with the bill to reorganize the Interstate Commerce Commission.

Testimony on behalf of the bus industry was given before the Senate committee by Arthur M. Hill, president of the National Association of Motor Bus Operators, Ivan Bowen, general counsel of the Greyhound Lines, and Edward W. Wakelee, a director of the bus operators' association. They expressed a desire for a separate bill providing for bus regulation and objected to certain provisions of the bills as applied to buses.

The hearing on the House side was concluded on Tuesday and that on the Senate side on Wednesday. Mr. Eastman is to sit with members of the Committees when they come to consider detail amendments in executive session.

President Roosevelt's message to Congress on merchant marine problems, which he had said would be followed in about a week by his general transportation message, was sent up on March 4, recommending a plan of direct subsidies for ocean shipping in place of the present system of indirect subsidies through ocean mail contracts. He also proposed that the quasi-judicial and quasi-legislative duties of the Shipping Board Bureau of the Department of Commerce be transferred for the present to the Interstate Commerce Commission, as had been recommended by Mr. Eastman. An accompanying report by an interdepartmental Committee on Shipping Policy had recommended the creation of a Federal Maritime Authority which would handle the regulation of rates in foreign commerce and temporarily in domestic commerce until such time as another body may be charged with the regulation of all domestic transportation rates.

The President said on Wednesday that he would have another message in about a week but indicated the possibility of some other subject intervening before the transportation message.

Construction

BALTIMORE & OHIO.—The New York Public Service Commission has approved a revised estimate of cost of $216,000, exclusive of land and property damages, for the elimination of the West Main street crossing on the line of the Buffalo, Rochester & Pittsburgh in LeRoy, Genesee county, N. Y. A low bid of $118,326 submitted by George Vang, Inc., Pittsburgh, Pa., was also approved as not excessive for the work in connection with the elimination of the crossing and the railroad was directed to award the contract and begin work as soon as practicable. The commission also approved a plan and specifications together with an estimate of cost of $157,700, exclusive of land and property damages, for the elimination of the grade crossing on the same road in Wheatland, Monroe county, N. Y. The crossing is located on the Scottsville-Mumford State highway about 200 ft. east of Mumford station.

CHESAPEAKE & OHIO.—Contracts involving a total expenditure of about $359,200 for work on two tunnels have recently been awarded by this road which has also authorized additional expenditures estimated at $308,915 for four other construction projects at various points on its line. Both of the tunnel contracts have been let to the Boxley Brothers Company, Orange, Va.—one contemplates the enlargement and lining of 350 ft., and the conversion into an open cut of 118 ft., of Needles Eye tunnel at Aden, Ky., at an estimated cost of $151,000; the other involves the enlargement to standard section and the lining with concrete of Mason's tunnel at Millboro, Va., at an estimated cost of $208,200. Of the additional projects authorized the two largest contemplate expenditures of $133,115 for the installation of signaling and interlocking facilities between Jerrys Run, Va., and White Sulphur, W. Va., and the extension of a passing track at Alleghany, Va.; and of $105,000 for the construction of an addition, together with improvements and rearrangements of existing buildings, to the company's hospital at Clifton Forge, Va. In connection with the former the grade has been prepared for the siding extension while plans are now being drawn for a new signal tower; for the hospital project plans to request bids are being prepared. The two remaining projects authorized are: Extension of four standard and four narrow gage tracks at Russell, Ky., $38,800; and replacing 16 column pedestals in a viaduct at Richmond, Va., $32,000.

STATEN ISLAND RAPID TRANSIT RAILWAY COMPANY.—This road, a subsidiary of the Baltimore & Ohio, is receiving bids until 11 a.m. March 18 at the office of the chief engineer of the Staten Island Rapid Transit Railway Company, Baltimore & Ohio Central building, Baltimore, Md., for building construction work at Fort Wadsworth, S. I., on a new station building which is to be put up in connection with grade crossing elimination work to be carried out at that place, as was reported in the *Railway Age* of February 2, page 213.

VIRGINIAN.—The Railroad Water & Coal Handling Company, Chicago, has been awarded a contract for the construction of a lime-soda water-softening plant at Elmore, W. Va., at a cost of about $25,000.

Equipment and Supplies

C. & N. W. Seeks $1,500,000 from R. F. C. for Equipment Repairs

The Chicago & North Western has filed with the Reconstruction Finance Corporation the first application for an equipment loan under the new loaning powers conferred upon the corporation by new legislation, asking for $1,500,000 for improvement and repairs to its equipment, including improvements and general repairs to 12 locomotives, classified repairs to 95 locomotives, air conditioning and modernizing of 66 passenger cars, modernizing 4 dining cars and 2 lounge cars, and installing Evans auto-loaders on 200 cars.

LOCOMOTIVES

THE LOUISIANA & ARKANSAS is inquiring for four Mikado type locomotives.

FREIGHT CARS

THE ERIE is inquiring for 55 steel frame milk cars of 40 tons' capacity.

IRON AND STEEL

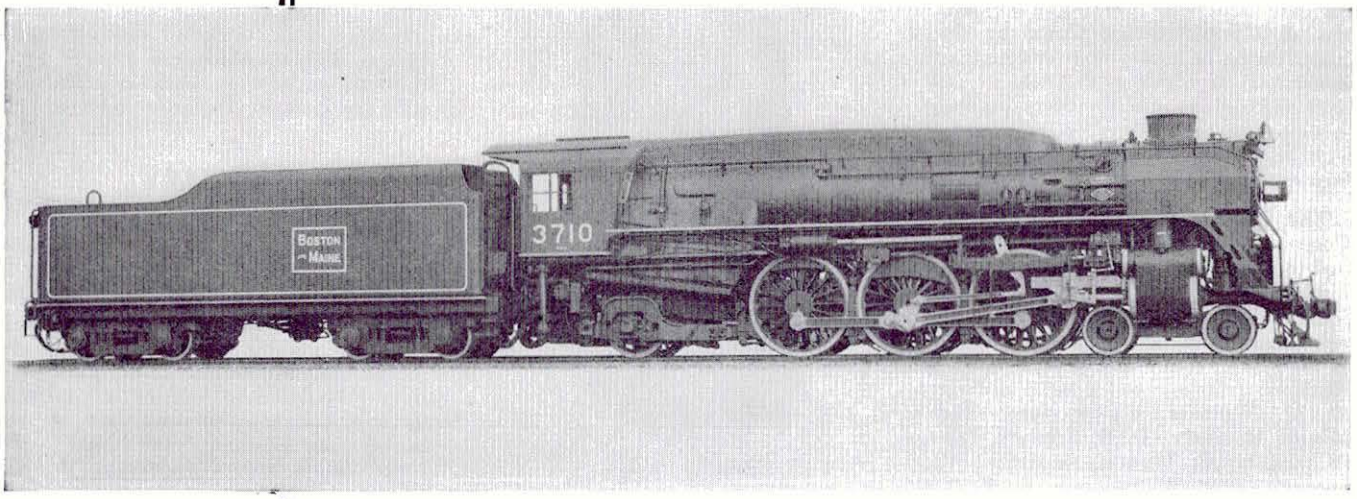
THE CHICAGO GREAT WESTERN is considering the purchase of 5,000 tons of rails.

THE DELAWARE, LACKAWANNA & WESTERN has ordered 152 tons of steel for a bridge at Ogden street, Newark, N. J., from the Phoenix Bridge Company.

AIR CONDITIONING

THE NEW YORK CENTRAL expects to place in service before hot weather arrives 235 additional air-conditioned cars. When the work now under way is completed the road will be operating 537 cars completely air-conditioned. The road is now equipping 7 dining cars in its own shops at West Albany, N. Y., and 46 coaches in its shops at Beech Grove, Ind. Both diners and coaches are being equipped with a electro-mechanical type of installation. At the same time 182 Pullman cars are being equipped for the New York Central service at the Pullman shops with the Pullman speed-control type of mechanism. When these cars are ready all the road's principal trains operating east and west between the principal cities they serve will be air conditioned.

Continued on next left-hand page



PASSENGER TRANSPORTATION

Comfort and safety coupled with higher speeds are demanded by passenger traffic.

Steam motive power best meets all these requirements.

Lima is prepared to supply Super-Power Locomotives competent for the job.

LIMA LOCOMOTIVE WORKS, INCORPORATED

LIMA LOCOMOTIVE WORKS INCORPORATED
LIMA OHIO

Supply Trade

Thomas R. Langan, who has been in the service of the **Westinghouse Electric & Manufacturing Company** since 1906, serving in important engineering and commercial activities in the field of railroad and railway electrification, has been appointed traffic manager of the company, with headquarters in the East Pittsburgh, Pa., works.

The Illinois Corrugated Culvert Company, Peoria, Ill., has been organized to fabricate and sell Toncan iron corrugated metal pipe in Illinois, the company being a member of the Toncan Culvert Manufacturers' Association. Officers of the new company are: president, **A. E. Hudson;** treasurer and general manager, **K. M. Walters;** and secretary, **Mrs. Minnie Easterly. D. R. Sanders,** Joliet, Ill., and **H. B. Moore,** Springfield, Ill., formerly representatives of the Canton Culvert Company, have been appointed special representatives of the new company. Construction of a modern culvert fabricating plant is under way at Peoria, but pending its completion, shipments are being made from Danville, where the new company is operating the plant formerly owned by the Canton Culvert Company, Division of Republic Steel Corporation.

J. William Hackett, for many years sales engineer of the Okonite Company, has been appointed special representative of the **United States Rubber Products, Inc., Wire Division,** New York. Following his graduation from Worcester Polytechnic Institute in 1907, Mr. Hackett joined the Union Switch & Signal Company as an engineering apprentice. He then entered the signal department of the New York Central, serving during this period as signal helper, electrical repairman, maintenance foreman of signals, circuit draftsman, chief draftsman, and later signal supervisor. In 1913 he resigned from the New York Central to go with the Federal Signal Company, now the General Railway Signal Company, as sales engineer. In 1917, he left that company and served with the army as an officer in the Engineering Corps. In 1919 he joined the Okonite Company as sales engineer, remaining until 1933. During this period Mr. Hackett was active in the Signal Appliance Association, serving on the Board of direction, as well as vice-chairman and chairman for a term. Prior to his present appointment, he has been associated with E. A. Everett, Inc., manufacturers of railroad and signal appliances, Long Island City, N. Y.

Frank P. Roesch, who has been elected a vice-president of the **Standard Stoker Company, Inc.,** with headquarters at Chicago, was born on April 14, 1864, in Alsace, and came to the United States immediately after the close of the Franco-Prussian war. Following his graduation from high school he entered railway service in 1877 as machinist apprentice at Trenton, Mo., on the Chicago, Rock Island & Pacific. He subsequently served in several railroad shops in various positions, including that of roundhouse foreman, also as a locomotive engineman. In 1891 he was appointed traveling engineer on the Denver & New Orleans, now the Colorado

Frank P. Roesch

& Southern, and later became general traveling engineer on the same road. In 1901 he was appointed master mechanic of the Colorado & Southern and subsequently served as master mechanic on the Chicago & Alton, the Southern, and the El Paso & Southwestern, now part of the Southern Pacific. Mr. Roesch served from 1918 to 1920 as regional fuel supervisor, Northwest region, U. S. R. A.; at the termination of federal control he went as western manager with the Standard Stoker Company, Inc., and since 1923 was its general sales manager. Mr. Roesch has been a frequent contributor to various railroad journals since 1898. He is an authority on subjects pertaining to locomotive operation, combustion, etc., and is a past president of the Traveling Engineers' Association. He has also been active in the affairs of the International Railway Fuel Association and the Smoke Prevention Association. He is a member of a large number of other technical and mechanical organizations and the patentee of a number of stoker appliances.

W. A. Hauck has been appointed assistant to the president of **Lukens Steel Company,** Coatesville, Pa. He is a

W. A. Hauck

graduate of Lafayette College with the degree of mining engineer and was formerly assistant comptroller of the Bethlehem Steel Corporation. Subsequently, he was connected with George W. Goethals, Inc., in company management and engineering work, and was also associated for several years with a New York stock exchange firm in underwriting and reorganization work. Prior to joining Lukens, he was with the American Iron & Steel Institute, engaged in work in connection with the code of the iron and steel industry.

OBITUARY

John S. Keefe, who retired from the presidency of the American Steel & Wire Company on January 1, 1933, died on March 3 at his home at Oak Park, Ill. Mr. Keefe was born on January 24, 1864, at Boston, Mass. At the age of 13 he became an office boy with the Chicago & North Western. In 1888 he left railway service to become traffic manager for the Illinois Steel Company, now a part of the United States Steel Corporation. In 1899 he was appointed general traffic manager of the American Steel & Wire Company, also a subsidiary of the United States Steel Corporation, and in 1901 became a director and first vice-president of that company. He was promoted to president in December, 1927, and retired under the corporation's pension plan on January 1, 1933, Mr. Keefe having requested that he be relieved of his duties on that date.

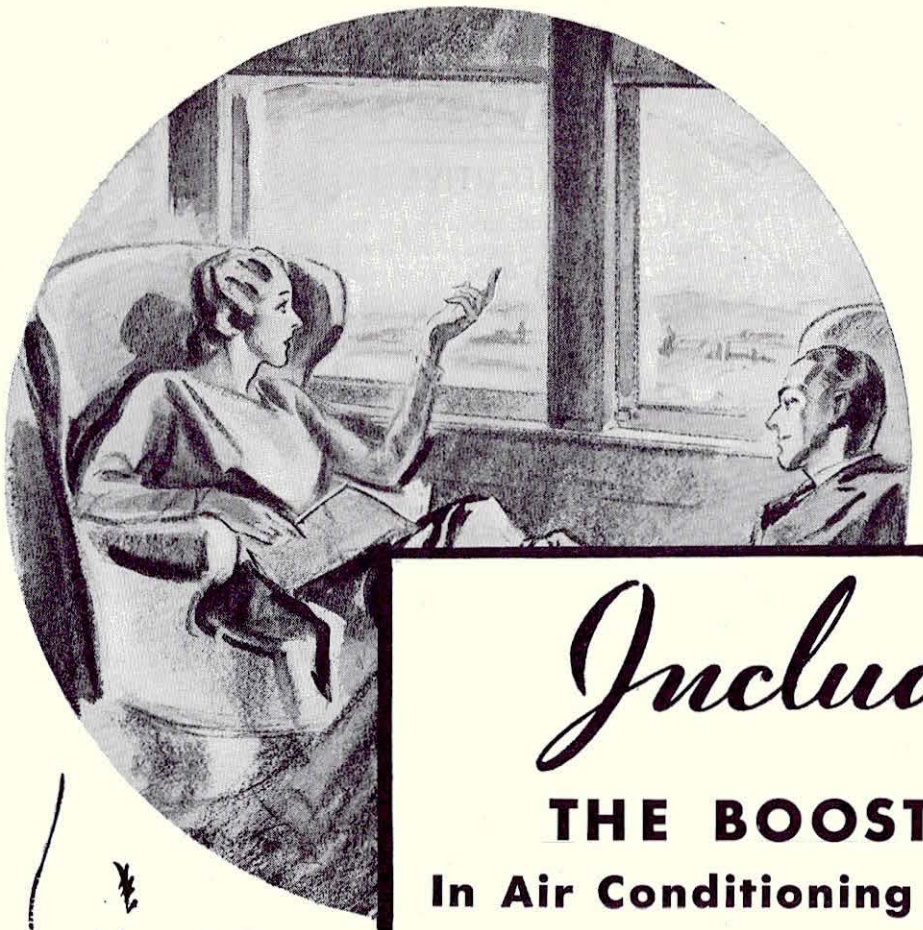
Financial

BALTIMORE & OHIO.—*R. F. C. Loans.*—This company has filed with the Reconstruction Finance Corporation an application for an extension for five years of loans amounting to $7,000,000 maturing April 8 and for an additional loan of $5,000,000 for five years to meet equipment trust obligations maturing during 1935. The company submitted with the application an estimate showing a net deficit of $1,909,139 for 1935.

CHICAGO GREAT WESTERN.—*Reorganization.*—The Interstate Commerce Commission has added the name of P. H. Joyce, president of the Chicago Great Western, to its panel of standing trustees from which appointments may be made by the federal courts.

MISSOURI PACIFIC.—*Reclassification of Claims.*—A reclassification of the claims against the Missouri Pacific was asked in a petition filed with Special Master Marion C. Early by counsel for the Reconstruction Finance Corporation. It is asked that the claims of the RFC, the Railroad Credit Corporation and J. P. Morgan & Co., totaling approximately $35,000,000, be placed in one class and that the claims arising from a deal with Terminal Shares, Inc., be regarded as among the general unsecured claims instead of being placed in a separate classification. The petition also asked that the creditors be classified according to the nature of the claim rather than according to the nature of the holder of such claim. The petition is intended to

Continued on next left-hand page



Include

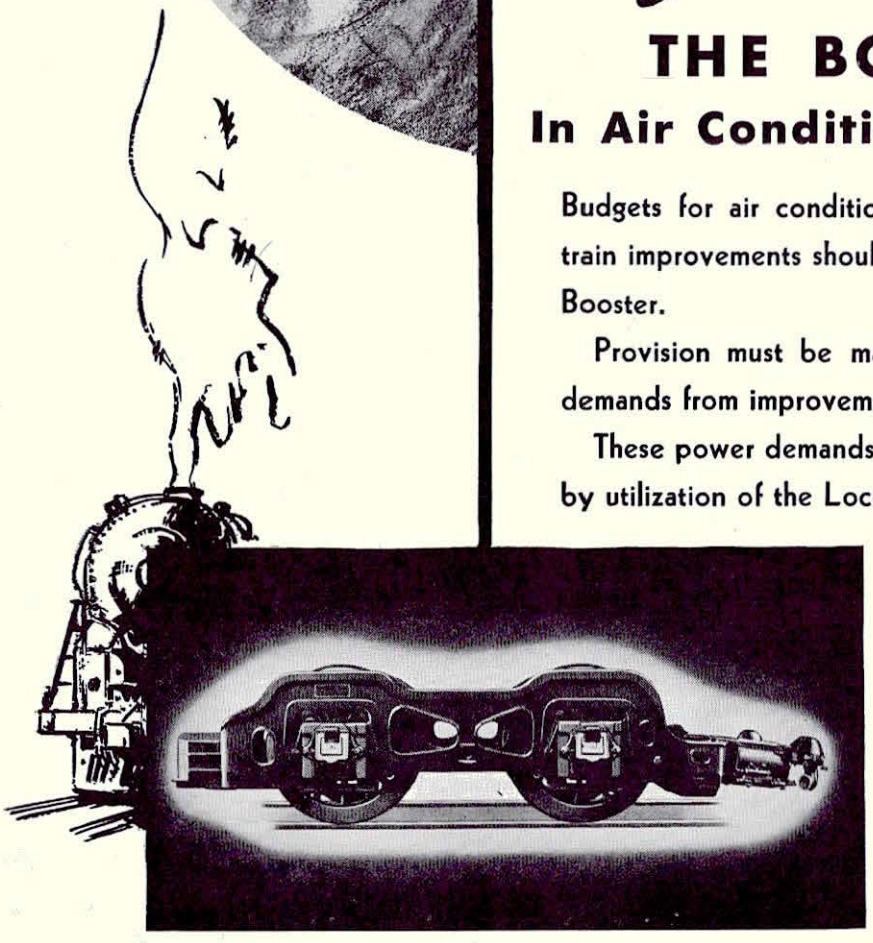
THE BOOSTER
In Air Conditioning Budgets

Budgets for air conditioning and other passenger train improvements should include the Locomotive Booster.

Provision must be made for increased power demands from improvements of this character.

These power demands can be compensated for by utilization of the Locomotive Booster to aid in smooth starting and maintaining schedules.

With the Booster on your locomotives you will not find yourself in the unfortunate position of having too much train or not enough locomotive.



Because material and tolerances are just right for the job, genuine Franklin repair parts give maximum service life.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK CHICAGO MONTREAL

prevent one creditor from blocking a plan for reorganization of the railroad.

NEW YORK, CHICAGO & ST. LOUIS.—*R. F. C. Loan.*—The Interstate Commerce Commission has authorized this company to extend to February 27, 1937, the time of payment of a loan of $6,700,000 which it has from the Reconstruction Finance Corporation.

NEW YORK, CHICAGO & ST. LOUIS.—*Substitute Trustee.*—This company has asked the Interstate Commerce Commission to approve the appointment of James R. Garfield, of Cleveland, Ohio, as trustee for its holdings of stock of the Wheeling & Lake Erie, succeeding E. R. Fancher, deceased, withdrawing the name of G. A. Tomlinson, which was recently submitted to the commission. F. E. Taplin, president of the Pittsburgh & West Virginia, had filed a protest against the appointment of Mr. Tomlinson.

READING COMPANY.—*Annual Report.*—The income account and balance sheet of this company for the year 1934 appear on an adjacent page.

SEABOARD AIR LINE.—*Receivers' Certificates.*—The receivers have applied to the Interstate Commerce Commission for authority to issue $27,859,000 of receivers' certificates in exchange for equipment obligations and receivers' certificates outstanding, in accordance with the plan filed with the district court for the eastern district of Virginia. The certificates are to bear 2 per cent interest from February 1, 1935, to February 1, 1938, 3 per cent from 1938 to 1940 and 3½ per cent from 1940 to 1945.

SOUTHERN.—*R. F. C. Loan.*—The Interstate Commerce Commission has authorized this company to extend for one year a loan of $7,254,000 from the Reconstruction Finance Corporation.

SOUTHERN PACIFIC.—*Preliminary Report.*—This company has issued its preliminary annual report for the year 1934, showing net income of the Southern Pacific Lines at $408,225, an increase of $5,397,156 over 1933. Freight revenues showed an increase of 16.36 per cent over the preceding year and total operating revenues were larger by 14.89 per cent, while operating expenses increased only 10.95 per cent. The solely controlled affiliated companies, however, had a deficit of $4,315,829.

Average Prices of Stocks and of Bonds

	Mar. 5	Last week	Last year
Average price of 20 representative railway stocks..	30.19	30.86	46.36
Average price of 20 representative railway bonds..	73.28	73.12	77.73

Dividends Declared

Dayton & Michigan.—8 Per Cent Preferred, $1.00, quarterly, payable April 2 to holders of record March 16; 87½c, semi-annually, payable April 1 to holders of record March 16.

Lackawanna R. R. of New Jersey.—4 Per Cent Guaranteed, $1.00, quarterly, payable April 1 to holders of record March 7.

New York, Lackawanna & Western.—$1.25, quarterly, payable April 1 to holders of record March 14.

Philadelphia & Trenton.—$2.50, quarterly, payable April 10 to holders of record April 1.

Reading.—Second Preferred, 50c, quarterly, payable April 11 to holders of record March 21.

Railway Officers

EXECUTIVE

W. S. Bronson, attorney for the Pittsburgh & West Virginia at Washington, D. C., has been elected vice-president and general counsel, with headquarters at Cleveland, Ohio, succeeding **C. F. Taplin,** resigned.

Arthur Hamilton, vice-president in charge of freight traffic of the Central of New Jersey, has retired from active service. Mr. Hamilton was born on February 27, 1865, at Bethel, Ill., and was educated in the public schools. He entered railway service in September, 1882, as a telegraph operator and station agent on the Chicago, Burlington & Quincy. In September, 1887, he was promoted to train dispatcher; in March, 1889, he became freight agent, and in October, 1892, he was promoted to traveling auditor. From May, 1896, to March, 1903, Mr. Hamilton was freight agent and manager of the Union Elevator Company

Arthur Hamilton

at East St. Louis, Ill., returning on the latter date to the Burlington as assistant superintendent of terminals at St. Louis, Mo. In December of the following year he was promoted to superintendent of terminals and a year later he was appointed superintendent of the Missouri & Illinois Bridge & Belt Railway at Alton, Ill. In May, 1906, he went with the Central of New Jersey as a general agent, with headquarters at Newark, N. J., and in June, 1909, he was promoted to general freight agent at New York. In January, 1924, Mr. Hamilton was appointed freight traffic manager at New York, which position he held until 1926, when he was appointed vice-president in charge of freight traffic.

John W. Hewitt, freight traffic manager of the Reading, with headquarters at Philadelphia, Pa., has been appointed assistant vice-president in charge of freight traffic for the Reading and the Central of New Jersey. Mr. Hewitt was born at Philadelphia in May, 1876. He entered the service of the Reading in June, 1892, as a clerk at the Broad and Callowhill streets freight station and six years later he became a clerk at Chestnut street station. In February, 1900, he was appointed chief clerk at Port Richmond terminal and in 1910 he became chief clerk in the general freight department, Reading terminal,

John W. Hewitt

Philadelphia. In March, 1920, he was appointed division freight agent at Philadelphia, becoming general coal freight agent in 1921. He was appointed assistant freight traffic manager in 1923 and in May, 1928, he became freight traffic manager at Philadelphia, retaining this position until his present appointment.

FINANCIAL, LEGAL AND ACCOUNTING

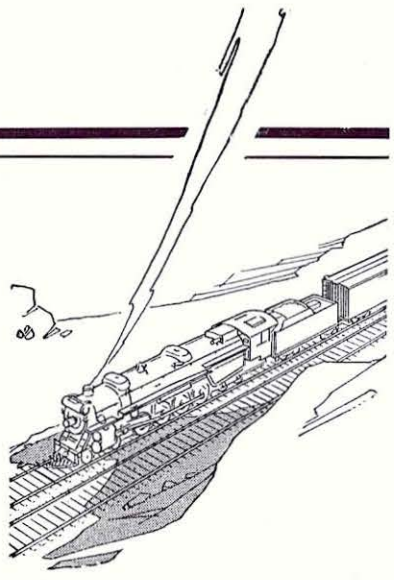
Norman S. Buckingham, general counsel of the New York, New Haven & Hartford, has retired from that position at his own request, and after a short leave of absence he will assume the duties of general solicitor. **William W. Meyer,** assistant to president and assistant general counsel, has been appointed general counsel in charge of law and finance. A photograph of Mr. Meyer, along with a sketch of his railway career was published in the *Railway Age* of November 3, 1934, in connection with his appointment as assistant to president.

Mr. Buckingham was born in Milford,

Norman S. Buckingham

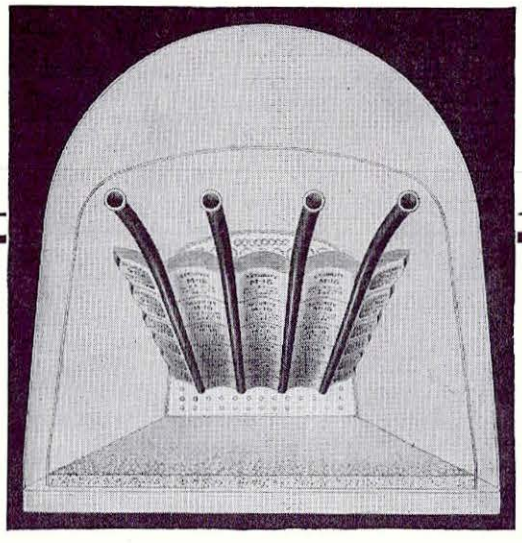
Conn., on April 30, 1881. He entered railway service with the New Haven as a clerk in the law department in 1898, after graduation from high school, and, in 1905,

Continued on next left-hand page



FIREBOX CONDITIONS

have changed!



There's More to
SECURITY ARCHES
Than Just Brick

THE locomotive firebox must withstand a lot more punishment than it did a few years ago.

Runs have lengthened from 100 miles to 500 or more. Locomotive mileage between shoppings has steadily increased. Firebox temperatures have risen until 2800° F. is not uncommon.

These factors all improve railroad operating efficiency but they are tough on Arch Brick.

Nevertheless, due to continuous development in design and quality of Security Brick the Security Arch actually costs less per 1,000 ton miles than it did when conditions were less severe.

The Security Sectional Arch is today one of the most effective of all fuel economy devices.

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists

NRA MEMBER U.S. WE DO OUR PART

AMERICAN ARCH CO.
INCORPORATED

Locomotive Combustion Specialists » » »

he was appointed chief clerk. While serving in the capacity of chief clerk he studied law, and in 1912 was admitted to the bar in Connecticut; shortly thereafter he was appointed assistant attorney. He continued in that position until 1916, when he was advanced to assistant solicitor, and two years later he was appointed counsel for Connecticut. In 1923, Mr. Buckingham was appointed assistant to vice-president, and in 1924, he was advanced to assistant general counsel. He was appointed general counsel in May, 1931.

OPERATING

A. H. Ryden has been appointed superintendent of telegraph of the Kansas City Southern, with headquarters at Kansas City, Mo., succeeding **R. Hooper,** deceased.

E. M. Dickerson, chief clerk to the superintendent of transportation of the Norfolk & Western, has been appointed assistant superintendent of transportation with headquarters at Roanoke, Va., succeeding **E. J. Tice,** deceased.

E. J. Walker, assistant superintendent for the Canadian Pacific at Toronto, Ont., has been appointed superintendent of the Quebec Central, with headquarters at Sherbrooke, Que., succeeding **C. K. Bartlett,** who has been appointed trainmaster. Mr. Walker will have jurisdiction over all branches of operation, including maintenance of way, motive power and car departments and highway motor coach services.

TRAFFIC

Chester D. Lafferty, industrial agent on the Southern Pacific at Portland, Ore., has had his title changed to assistant general freight agent.

Miss E. J. Raymond, general agent at Chicago for the Green Bay & Western, has been appointed to the newly-created position of assistant general freight agent in charge of solicitation, with the same headquarters.

A. B. Craig, assistant general freight agent for the Central of New Jersey at New York, has been appointed general freight agent, with the same headquarters. **A. S. Huntington,** commerce assistant, has been appointed assistant general freight agent at New York.

John F. Hourigan, general agent for the Wharton & Northern, with headquarters at Wharton, N. J., has been appointed assistant general freight agent for the Central of New Jersey, with headquarters at New York.

Charles Loos Ewing, freight traffic manager for the Central of New Jersey, with headquarters at New York, has been appointed general freight traffic manager. Mr. Ewing was born at Pittsburgh, Pa., on December 1, 1877, and was educated in the public schools. He entered railroad service in 1894 as freight traffic clerk for the Pittsburgh & Lake Erie at Pittsburgh, Pa., in which capacity he served until 1898.

C. L. Ewing

In the latter year he became apportionment clerk, Railway Clearing House, Buffalo, N. Y. From 1899 to 1902 he served as department manager of the Snyder Banana Company and the United Fruit Company, Bocas del Toro, Republic of Colombia. In 1902 he became rate and percentage clerk, freight traffic department, for the Central of New Jersey at New York, becoming assistant chief rate clerk in 1905, and chief rate clerk in 1906. Mr. Ewing was appointed chief of the tariff bureau of the Central of New Jersey in 1909, and in 1915 he became assistant general freight agent. From 1924 to 1926 Mr. Ewing served as general freight agent and in 1926 he became freight traffic manager, the position he held until his recent appointment.

MECHANICAL

A. C. Colville has been appointed superintendent of shops on the Great Northern at Hillyard, Wash., succeeding **J. M. Hurley,** deceased.

OBITUARY

J. M. Hurley, superintendent of shops on the Great Northern at Hillyard, Wash., died on February 23.

Harry C. Higgins, general agent for the Minneapolis & St. Louis, with headquarters at Minneapolis, Minn., died on February 23.

William Henry Reid, who retired eight years ago as president of the Pittsburgh, Lisbon & Western, died suddenly on March 3 of a heart attack at his home in New York.

S. George Tiffin, commissioner of the industrial department of the Canadian National, with headquarters at Montreal, Que., died on March 2 at his home in Montreal after a brief illness.

Edward S. Hartwell, who was formerly connected at various times with the Colorado Springs & Cripple Creek, the Midland Terminal and the Manitou & Pike's Peak as secretary and auditor, died at Los Angeles on February 15.

Net Income for December and Twelve Months of Calendar Year 1934

		Net Income 1934	Net Income 1933
Akron, Canton & Youngstown	Dec.	15,611	9,596
	12 mos.	116,438	118,327
Alton	Dec.	— 144,433	142,259
	12 mos.	— 1,644,579	— 43,251
Atchison, Topeka & Santa Fe	Dec.	911,774	193,408
	12 mos.	7,001,314	3,698,671
Atlanta & West Point	Dec.	— 24,657	— 21,662
	12 mos.	— 133,548	— 209,900
Western of Alabama	Dec.	— 22,621	1,545
	12 mos.	— 82,613	— 113,328
Atlanta, Birmingham & Coast	Dec.	— 43,110	— 14,432
	12 mos.	— 317,564	— 223,375
Atlantic Coast Line	Dec.	— 386,347	— 392,781
	12 mos.	— 495,478	— 2,385,788
Charleston & Western Carolina	Dec.	5,066	16,172
	12 mos.	102,738	152,911
Baltimore & Ohio	Dec.	— 330,513	— 320,836
	12 mos.	— 3,825,752	204,772
Staten Island Rapid Transit	Dec.	.....	.....
	12 mos.	.....	.....
Bangor & Aroostook	Dec.	47,746	121,662
	12 mos.	947,394	993,576
Bessemer & Lake Erie	Dec.	— 243,608	— 117,402
	12 mos.	390,409	1,373,623
Boston & Maine	Dec.	698,949	— 38,494
	12 mos.	293,493	321,571
Burlington-Rock Island	Dec.	— 84,892	— 67,424
	12 mos.	— 1,027,449	— 753,097
Cambria & Indiana	Dec.	51,667	81,256
	12 mos.	583,402	926,517
Canadian Pacific Lines in Maine	Dec.	.....	.....
	12 mos.	.....	.....
Canadian Pacific Lines in Vermont	Dec.	.....	.....
	12 mos.	.....	.....
Central of Georgia	Dec.	— 241,178	— 208,321
	12 mos.	— 2,607,342	— 2,669,565
Central New Jersey	Dec.	— 160,805	— 330,341
	12 mos.	— 1,536,070	— 2,309,738
Central Vermont	Dec.	— 100,626	— 78,152
	12 mos.	— 1,068,192	— 875,468
Chesapeake & Ohio	Dec.	2,134,477	2,071,204
	12 mos.	28,062,403	28,239,810
Chicago & Eastern Illinois	Dec.	114,069	— 82,462
	12 mos.	— 1,494,200	— 2,020,504
Chicago & Illinois Midland	Dec.	25,491	66,876
	12 mos.	143,276	321,224
Chicago & Northwestern	Dec.	— 598,975	— 840,939
	12 mos.	— 8,276,194	— 7,875,419
Chicago, Burlington & Quincy	Dec.	361,849	755,461
	12 mos.	4,454,760	5,598,024
Chicago Great Western	Dec.	14,720	116,913
	12 mos.	— 468,823	— 514,825
Chicago, Indianapolis & Louisville	Dec.	360,848	— 21,573
	12 mos.	— 1,416,314	— 1,514,467
Chicago, Mil., St. Paul & Pacific	Dec.	— 1,662,838	— 1,543,702
	12 mos.	—16,247,621	—14,412,141
Chicago, Rock Island & Pacific	Dec.	— 1,254,267	— 1,411,451
	12 mos.	—11,943,697	— 9,998,794
Chicago, Rock Island & Gulf	Dec.	— 253,319	— 243,825
	12 mos.	— 1,367,704	— 1,604,052

Continued on next left-hand page

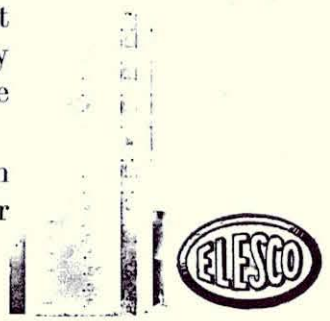
Added Boiler Capacity —by Reclaiming *Waste* Heat

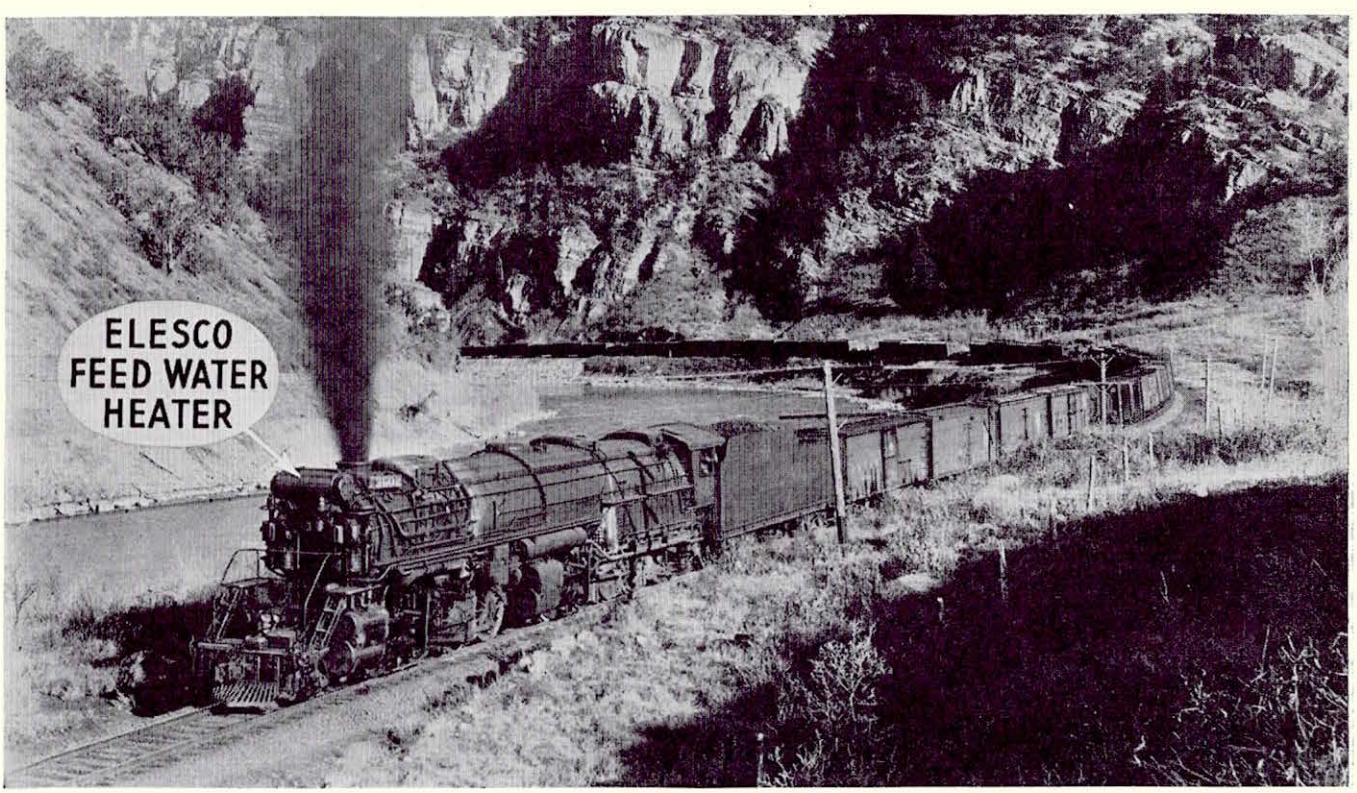
Today, when locomotives are being taxed to the limit, it is profitable to have reserve steaming capacity available for all requirements — to pull heavier loads, to make hard grades, for train heating.

Any boiler capacity can be increased just by reclaiming and utilizing waste heat in exhaust steam. An Elesco feed water heater does this by transferring heat in exhaust steam back to the boiler through the feed water — thereby adding a substantial amount of capacity to any locomotive boiler.

No cheaper, quicker, and easier maintained addition can be made to a boiler than to apply an Elesco feed water heater.

IT PAYS WHILE IT SAVES.





THE SUPERHEATER COMPANY

Representative of AMERICAN THROTTLE COMPANY, Inc.

60 East 42nd Street NEW YORK

NRA MEMBER U.S. WE DO OUR PART A-965

Peoples Gas Building CHICAGO

Canada: The Superheater Company, Limited, Montreal

Superheaters - Feed Water Heaters - Exhaust Steam Injectors - Superheated Steam Pyrometers - American Throttles

Net Income for December and Twelve Months of Calendar Year 1934 (Continued)

		Net Income 1934	1933
Chicago, St. Paul, Minn. & Omaha	Dec.	— 280,625	— 133,559
	12 mos.	— 1,923,210	— 1,060,225
Clinchfield Railroad	Dec.	474,789	651,853
	12 mos.	.....	.....
Colorado & Southern	Dec.	— 33,883	— 27,826
	12 mos.	— 854,138	— 943,390
Fort Worth & Denver City	Dec.	— 26,770	64,429
	12 mos.	— 53,798	412,812
Columbus & Greenville	Dec.	— 11,414	— 16,865
	12 mos.	— 7,372	85,492
Delaware & Hudson	Dec.	474,353	— 268,783
	12 mos.	— 2,601,063	— 3,699,772
Delaware, Lackawanna & Western	Dec.	— 320,769	— 230,783
	12 mos.	— 1,972,613	— 2,993,862
Denver & Rio Grande Western	Dec.	189,970	— 97,413
	12 mos.	— 2,975,872	— 2,138,953
Denver & Salt Lake	Dec.	— 179,200	— 249,524
	12 mos.	113,134	4,146
Detroit & Mackinac	Dec.	— 31,664	— 11,723
	12 mos.	— 14,345	— 75,012
Detroit & Toledo Shore Line	Dec.	58,644	96,769
	12 mos.	623,564	503,599
Detroit, Toledo & Ironton	Dec.	117,896	62,463
	12 mos.	1,137,789	342,361
Duluth, Missabe & Northern	Dec.	227,014	55,333
	12 mos.	1,346,452	10,684,914
Duluth, Winnipeg & Pacific	Dec.	841,417	516,968
	12 mos.	327,147	106,786
Elgin, Joliet & Eastern	Dec.	463,112	48,963
	12 mos.	— 389,059	— 477,001
Erie Railroad	Dec.	— 307,750	245,455
	12 mos.	— 601,034	531,529
New Jersey & New York	Dec.	— 46,442	— 28,835
	12 mos.	— 485,899	— 380,728
N. Y., Susquehanna & Western	Dec.	— 18,486	2,978
	12 mos.	— 385,038	— 416,881
Florida East Coast	Dec.	— 183,480	— 166,122
	12 mos.	— 2,806,591	— 3,185,635
Fort Smith & Western	Dec.	— 25,896	— 22,034
	12 mos.	— 322,450	— 284,814
Georgia Railroad	Dec.	14,307	— 34,010
	12 mos.	— 97,566	— 144,328
Georgia & Florida	Dec.	— 65,026	— 59,658
	12 mos.	— 676,530	— 618,310
Grand Trunk Western	Dec.	— 56,286	162,734
	12 mos.	— 1,639,964	— 3,866,678
Canadian Nat'l Lines in New Eng.	Dec.	1,368,713	1,236,547
	12 mos.	96,880	27,739
Great Northern	Dec.	1,384,221	2,177,450
	12 mos.	— 1,074,480	— 3,187,760
Green Bay & Western	Dec.	24,214	23,556
	12 mos.	27,267	93,733
Gulf & Ship Island	Dec.	254	— 6,662
	12 mos.	— 220,530	— 235,147
Gulf, Mobile & Northern	Dec.	532	— 17,134
	12 mos.	— 170,740	— 55,712
Illinois Central	Dec.	445,327	809,587
	12 mos.	— 1,005,608	1,377,874
Yazoo & Mississippi Valley	Dec.	— 106,892	72,755
	12 mos.	— 2,004,243	— 1,264,013
Illinois Terminal	Dec.	53,963	— 9,462
	12 mos.	— 395,907	— 260,853
Kansas City Southern System	Dec.	— 89,625	— 162,404
	12 mos.	— 1,009,127	— 1,244,546
Kansas, Oklahoma & Gulf	Dec.	52,698	20,942
	12 mos.	368,188	303,130
Lake Superior & Ishpeming	Dec.	— 40,543	— 23,043
	12 mos.	311,775	796,993
Lehigh & Hudson River	Dec.	22,388	7,921
	12 mos.	184,337	214,941
Lehigh & New England	Dec.	48,192	43,987
	12 mos.	362,578	300,338
Lehigh Valley	Dec.	154,359	— 252,571
	12 mos.	— 1,891,141	— 2,775,833
Louisiana & Arkansas	Dec.	19,830	2,739
	12 mos.	291,802	151,187
Louisiana, Arkansas & Texas	Dec.	12,253	— 3,602
	12 mos.	— 30,114	— 76,723
Louisville & Nashville	Dec.	122,681	— 67,028
	12 mos.	2,967,385	1,795,716
Maine Central	Dec.	72,902	— 51,196
	12 mos.	35,251	19,285
Midland Valley	Dec.	42,220	— 9,560
	12 mos.	59,619	57,539
Minneapolis & St. Louis	Dec.	— 274,500	— 197,527
	12 mos.	— 2,943,072	— 2,745,626
Minn., St. Paul & S. S. Marie	Dec.	— 468,685	— 325,146
	12 mos.	— 5,078,543	— 4,821,146
Duluth, South Shore & Atlantic	Dec.	— 136,182	— 46,300
	12 mos.	— 827,144	— 991,489
Spokane International	Dec.	— 30,936	— 24,245
	12 mos.	— 325,150	— 365,676
Mississippi Central	Dec.	— 20,076	— 12,217
	12 mos.	— 141,915	— 137,974
Missouri & North Arkansas	Dec.	— 21,216	— 18,813
	12 mos.	— 187,754	— 199,323
Missouri-Illinois	Dec.	— 2,576	— 2,311
	12 mos.	— 71,481	— 103,046
Missouri-Kansas-Texas Lines	Dec.	— 429,707	152,616
	12 mos.	— 2,790,636	— 1,516,998
Missouri Pacific	Dec.	— 1,593,600	— 1,438,012
	12 mos.	—14,201,818	—13,054,477
Gulf Coast Lines	Dec.	.....	.....
	12 mos.	.....	.....
International-Great Northern	Dec.	— 1,195,907	— 1,113,983
	12 mos.	— 1,417,368	— 1,285,393
San Antonio, Uvalde & Gulf	Dec.	— 25,007	— 18,396
	12 mos.	— 182,082	— 338,265
Mobile & Ohio	Dec.	— 193,971	— 124,403
	12 mos.	— 1,704,221	— 1,549,892
Monongahela	Dec.	— 30,189	35,234
	12 mos.	233,203	318,331
Montour	Dec.	50,498	27,444
	12 mos.	759,130	729,808
Nashville, Chattanooga & St. Louis	Dec.	— 79,363	— 27,140
	12 mos.	— 351,939	— 292,326
Nevada Northern	Dec.	1,576	1,642
	12 mos.	61,434	— 21,669
New York Central	Dec.	848,335	— 378,609
	12 mos.	— 7,682,335	— 5,412,514
Pittsburgh & Lake Erie	Dec.	439,297	292,598
	12 mos.	2,921,162	2,565,250
New York, Chicago & St. Louis	Dec.	38,421	— 120,363
	12 mos.	58,634	— 1,205,636
New York, New Haven & Hartford	Dec.	— 504,529	— 406,225
	12 mos.	— 5,532,116	— 4,853,832
New York Connecting	Dec.	26,477	— 66,036
	12 mos.	— 4,996	11,875
New York, Ontario & Western	Dec.	100,687	29,043
	12 mos.	— 78,420	372,583
Norfolk & Western	Dec.	1,858,626	2,100,780
	12 mos.	20,464,493	22,479,409
Norfolk Southern	Dec.	— 48,619	— 6,094
	12 mos.	— 335,935	— 522,114
Northern Pacific	Dec.	3,713,811	6,652,932
	12 mos.	899,407	303,981
Northwestern Pacific	Dec.	— 137,002	— 135,617
	12 mos.	— 1,440,124	— 1,624,504
Oklahoma City-Ada-Atoka	Dec.	— 7,645	— 13,248
	12 mos.	— 88,650	— 108,640
Pennsylvania Railroad	Dec.	1,274,041	122,651
	12 mos.	18,815,693	19,281,170
Long Island	Dec.	205,975	335,035
	12 mos.	329,452	2,243,258
Pennsylvania-Reading Seashore Lines	Dec.	— 232,870	— 344,103
	12 mos.	— 2,871,149	— 1,999,642
Pere Marquette	Dec.	— 136,270	— 21,230
	12 mos.	— 612,127	— 1,599,471
Pittsburg & Shawmut	Dec.	— 12,560	338,362
	12 mos.	7,182	144,613
Pittsburgh & West Virginia	Dec.	— 24,503	— 26,753
	12 mos.	— 92,271	— 106,107
Pittsburg, Shawmut & Northern	Dec.	— 2,044	— 18,208
	12 mos.	— 170,371	— 26,826
Reading	Dec.	483,563	513,441
	12 mos.	5,682,054	6,715,523
Richmond, Fredericksburg & Potomac	Dec.	150,660	— 20,830
	12 mos.	324,271	292,320
Rutland	Dec.	— 22,459	— 8,995
	12 mos.	— 375,102	— 70,328
St. Louis-San Francisco	Dec.	— 1,086,239	— 943,266
	12 mos.	— 9,583,990	— 9,295,704
Fort Worth & Rio G[illegible]de	Dec.	— 26,036	— 25,309
	12 mos.	— 265,877	— 390,954
St. Louis, San Francisco & Texas	Dec.	— 69,083	— 50,606
	12 mos.	— 656,580	— 492,378
St. Louis Southwestern Lines	Dec.	— 268,276	— 156,893
	12 mos.	— 1,145,437	— 1,536,894
San Diego & Arizona Eastern	Dec.	— 24,089	— 12,153
	12 mos.	— 96,793	— 143,124
Seaboard Air Line	Dec.	— 543,900	— 443,953
	12 mos.	— 8,029,553	— 6,530,504
Southern Railway	Dec.	1,248,774	712,096
	12 mos.	— 2,773,136	— 710,320
Alabama Great Southern	Dec.	263,481	331,168
	12 mos.	547,695	484,466
Cinn., New Orleans & Texas Pacific	Dec.	203,452	108,337
	12 mos.	1,633,279	1,863,173
Georgia Southern & Florida	Dec.	37,523	24,953
	12 mos.	— 200,722	— 277,286
New Orleans & Northeastern	Dec.	— 312	— 9,824
	12 mos.	— 287,707	— 544,519
Northern Alabama	Dec.	15,495	10,556
	12 mos.	66,973	— 100,125
Southern Pacific Transp. System	Dec.	1,335,394	1,699,588
	12 mos.	408,225	— 4,990,931
Spokane, Portland & Seattle	Dec.	— 84,273	111,011
	12 mos.	— 1,985,248	— 2,334,903
Tennessee Central	Dec.	— 2,043	— 8,960
	12 mos.	38,263	— 37,552
Texas & Pacific	Dec.	92,584	308,366
	12 mos.	1,031,944	103,758
Texas Mexican	Dec.	8,051	— 16,641
	12 mos.	— 25,855	— 287,486
Toledo, Peoria & Western	Dec.	— 4,496	— 39,315
	12 mos.	72,817	120,290
Union Pacific	Dec.	3,411,463	5,535,437
	12 mos.	19,751,359	25,182,284
Oregon Short Line	Dec.	273,922	113,737
	12 mos.	1,316,450	1,088,282
Oregon-Washington R. R. & Nav. Co.	Dec.	— 277,480	— 323,715
	12 mos.	— 2,888,510	— 3,775,804
Los Angeles & Salt Lake	Dec.	— 85,720	— 270,204
	12 mos.	468,050	— 985,432
St. Joseph & Grand Island	Dec.	36,073	56,055
	12 mos.	452,634	530,768
Utah	Dec.	27,214	— 6,687
	12 mos.	— 248,534	— 144,093
Virginian	Dec.	386,770	361,906
	12 mos.	3,574,440	2,956,652
Wabash	Dec.	— 155,797	— 166,814
	12 mos.	— 3,107,621	— 4,823,058
Ann Arbor	Dec.	— 9,596	— 26,221
	12 mos.	— 52,288	— 226,032
Western Maryland	Dec.	124,745	152,054
	12 mos.	995,255	936,051
Western Pacific	Dec.	— 163,427	— 152,502
	12 mos.	— 1,599,467	— 2,087,808
Wheeling & Lake Erie	Dec.	298,740	— 11,173
	12 mos.	1,197,549	1,065,050
Wichita Falls & Southern	Dec.	— 7,222	3,364
	12 mos.	— 90,089	— 44,765

Tables of Revenues and Expenses of Railways begin on next left-hand page

AMERICAN LOCOMOTIVE CO.

"IN spite of new inventions and new competition, the steam locomotive still stands unchallenged as the simplest, most flexible, best all-around source of power on wheels ever developed. And those who say that steam is doomed are talking through their hats."

By Harwood F. Merrill
In Forbes Magazine, January 1, 1935.

30 CHURCH ST. NEW YORK N.Y.

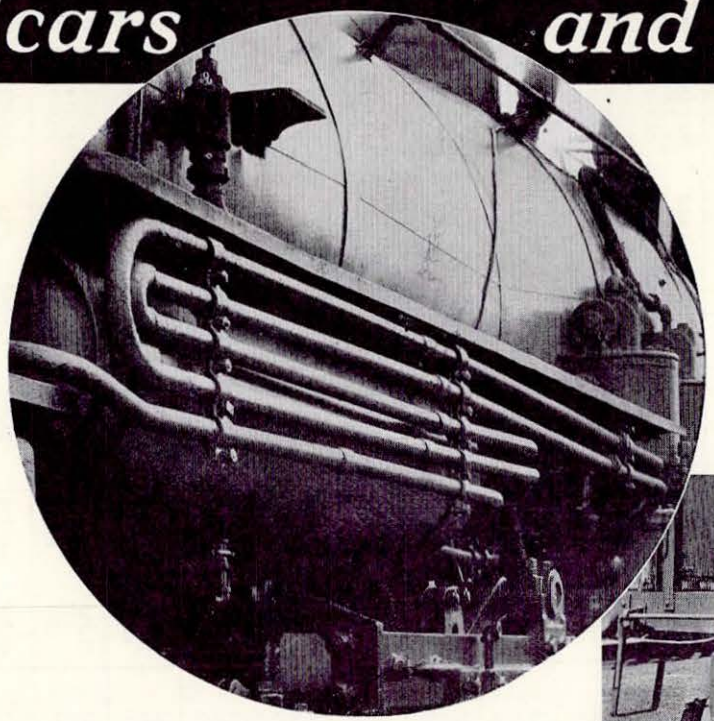
Revenues and Expenses of Railways

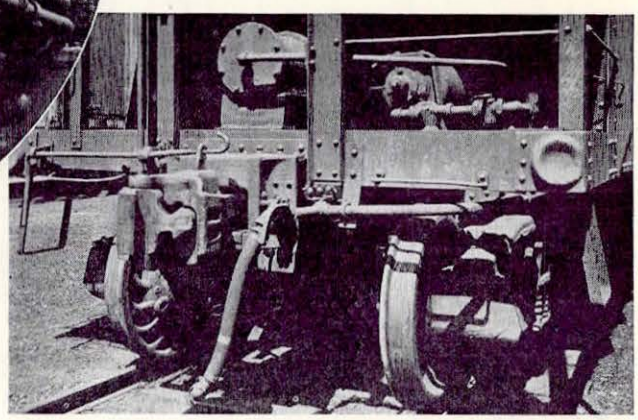
MONTH OF JANUARY OF CALENDAR YEAR 1935

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures	Maintenance of Equipment	Traffic	Transportation	General	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income	Net ry. operating income, 1934
Akron, Canton & Youngstown	Jan.	171	$172,551	$16	$181,308	$15,636	$14,022	$7,648	$57,675	$10,856	$105,837	58.4	$75,471	$66,383	$52,450	$21,995
Alton	Jan.	949	739,622	143,068	1,040,298	116,399	164,661	39,431	440,026	69,229	844,213	81.2	196,085	125,248	—19,580	—2,612
Atchison, Topeka & Santa Fe	Jan.	13,323	7,889,825	1,044,593	9,809,898	1,257,376	2,685,700	383,112	3,934,973	645,793	8,924,235	91.0	885,663	16,437	—101,415	117,755
Gulf, Colorado & Santa Fe	Jan.					INCLUDED IN ABOVE										
Panhandle & Santa Fe	Jan.					INCLUDED IN ABOVE										
Atlanta & West Point	Jan.	93	80,478	18,699	119,112	16,577	24,766	6,870	53,092	6,568	110,248	92.6	8,864	1,541	—9,986	—9,959
Western of Alabama	Jan.	133	69,052	19,020	102,125	19,285	28,441	6,979	47,916	5,943	110,541	108.2	—8,416	—16,511	—12,953	4,258
Atlanta, Birmingham & Coast	Jan.	639	187,884	6,434	223,015	42,208	44,967	21,704	99,737	21,382	240,690	107.9	—17,675	—30,738	—42,053	—28,700
Atlantic Coast Line	Jan.	5,147	2,324,248	658,994	3,424,860	407,946	685,235	146,953	1,368,764	137,410	2,798,695	81.7	626,165	225,807	103,457	652,435
Charleston & Western Carolina	Jan.	342	151,122	1,066	156,781	25,743	25,782	6,021	55,947	4,503	117,996	75.3	38,785	22,285	22,735	39,670
Baltimore & Ohio	Jan.	6,440	9,541,432	800,256	11,037,809	828,306	2,269,840	308,249	4,182,111	570,439	8,256,935	74.8	2,780,874	2,107,550	1,793,958	1,224,911
Staten Island Rapid Transit	Jan.	23	41,004	70,795	118,882	13,852	15,241	1,964	86,597	12,831	130,485	109.8	—11,603	—28,211	—60,563	—5,676
Bangor & Aroostook	Jan.	603	676,731	34,478	733,578	118,238	83,560	4,580	171,273	33,506	411,855	56.1	321,723	265,831	246,337	214,341
Bessemer & Lake Erie	Jan.	225	389,398	900	399,871	38,068	270,701	11,363	123,039	44,820	487,991	122.0	—88,120	—108,951	—93,923	—141,709
Boston & Maine	Jan.	2,038	2,402,343	624,164	3,510,353	632,259	563,331	54,449	1,606,074	169,042	3,035,133	86.5	475,220	284,986	83,949	406,465
Brooklyn Eastern District Terminal	Jan.	10.91	79,887	.....	82,302	4,383	5,950	214	26,627	6,926	44,100	53.6	38,202	31,625	31,625	29,706
Burlington-Rock Island	Jan.	280	62,398	3,686	70,058	12,799	11,930	4,144	40,239	9,461	78,573	112.2	—8,515	—15,272	—22,975	—13,891
Cambria & Indiana	Jan.	37	102,152	.....	102,293	4,942	38,128	379	12,488	6,357	62,294	60.89	39,999	21,542	99,310	97,307
Canadian Pacific Lines in Maine	Jan.	233	177,997	15,558	205,826	32,733	40,920	10,181	82,718	6,143	173,517	84.3	32,309	26,309	3,833	29,615
Canadian Pacific Lines in Vermont	Jan.	85	46,707	10,175	69,404	12,705	21,600	4,526	60,247	5,230	104,625	150.7	—35,221	—40,221	—56,908	—34,209
Central of Georgia	Jan.	1,926	853,165	114,879	1,103,079	128,887	248,613	50,815	482,027	96,893	1,013,350	91.9	89,729	16,500	—15,901	43,017
Central New Jersey	Jan.	687	1,996,191	327,569	2,469,131	177,543	514,209	40,131	1,085,931	147,933	1,981,685	80.3	487,446	311,935	190,021	674,214
Central Vermont	Jan.	455	305,338	41,650	384,845	55,973	103,515	13,748	218,875	21,694	413,847	107.5	—29,002	—44,910	—54,818	4,064
Chesapeake & Ohio	Jan.	3,115	8,094,518	219,771	8,601,701	890,073	1,653,785	190,307	2,088,770	298,967	5,134,577	59.7	3,467,124	2,605,728	2,660,644	2,679,268
Chicago & Eastern Illinois	Jan.	938	914,233	91,473	1,128,602	126,019	190,578	51,313	460,989	57,210	893,728	79.2	234,874	159,783	39,314	—41,099
Chicago & Illinois Midland	Jan.	131	266,618	1,114	273,929	33,851	65,973	16,068	77,008	20,341	213,241	77.8	60,688	52,163	57,158	79,074
Chicago & North Western	Jan.	8,428	4,129,376	705,508	5,504,499	523,682	1,191,233	165,347	2,501,372	378,607	4,799,843	87.2	704,656	192,664	—57,017	420,484
Chicago, Burlington & Quincy	Jan.	9,036	4,885,923	520,352	6,075,668	525,733	1,346,746	189,785	2,504,945	413,693	5,043,429	83.0	1,032,239	490,900	198,228	909,163
Chicago Great Western	Jan.	1,511	1,006,834	46,629	1,143,891	187,164	189,842	55,813	536,035	73,914	1,039,164	90.8	104,727	48,038	—125,109	—10,702
Chicago, Indianapolis & Louisville	Jan.	647	509,204	45,305	626,667	47,915	135,901	23,712	282,091	41,340	537,352	85.7	89,315	64,241	—28,818	—15,211
Chicago, Milw., St. Paul & Pacific	Jan.	11,160	5,604,182	415,564	6,718,070	744,427	1,496,891	198,025	3,023,594	426,167	5,941,190	88.4	776,880	233,834	—196,407	423,712
Chicago, Rock Island & Pacific	Jan.	7,576	3,700,903	505,242	4,726,595	486,391	1,098,805	183,733	2,327,298	394,449	4,551,994	96.3	174,601	—198,785	—483,339	160,260
Chicago, Rock Island & Gulf	Jan.	721	252,763	24,578	284,415	39,486	28,102	16,643	121,469	25,777	231,539	81.4	52,876	35,002	—18,599	3,668
Chicago, St. Paul, Minn. & Omaha	Jan.	1,654	925,312	129,540	1,140,168	130,928	151,196	30,179	671,212	88,560	1,081,863	94.9	58,305	—16,625	—88,166	88,968
Clinchfield Railroad	Jan.	309	442,713	3,331	450,774	36,895	98,166	16,026	93,161	12,593	256,841	57.0	193,933	155,933	181,717	200,158
Colorado & Southern	Jan.	1,019	352,988	22,763	421,030	37,754	94,517	12,678	190,532	42,694	379,800	90.2	41,230	—13,442	—27,693	1,769
Fort Worth & Denver City	Jan.	804	299,497	33,834	392,258	34,636	78,196	16,501	153,328	38,570	324,432	82.7	67,826	37,128	9,393	89,432
Columbus & Greenville	Jan.	167	54,166	6,631	65,748	15,572	14,236	3,740	33,615	9,753	76,916	117.0	—11,168	—14,854	—13,631	2,899
Delaware & Hudson	Jan.	835	1,836,505	104,861	2,020,174	294,901	553,136	47,420	799,420	186,010	1,887,502	93.4	132,672	44,679	71,725	236,894
Delaware, Lackawanna & Western	Jan.	992	2,819,484	554,784	3,767,984	251,439	754,973	108,898	1,804,242	158,607	3,094,363	82.1	673,621	322,693	316,012	104,765
Denver & Rio Grande Western	Jan.	2,634	1,359,247	81,619	1,523,810	103,347	342,025	55,162	543,801	109,168	1,158,387	76.0	365,423	205,152	161,564	305,767
Denver & Salt Lake	Jan.	232	151,065	4,114	165,670	9,476	27,402	1,574	38,759	10,026	84,102	50.8	81,568	67,568	105,061	44,526
Detroit & Mackinac	Jan.	242	28,981	3,697	37,364	6,831	7,849	860	21,878	4,019	41,445	110.9	—4,081	—6,450	—8,098	—5,144
Detroit & Toledo Shore Line	Jan.	50	352,364	.....	355,055	16,422	24,809	7,042	82,835	9,093	140,201	39.5	214,854	181,121	125,469	99,758
Detroit, Toledo & Ironton	Jan.	472	775,952	328	806,953	55,629	91,425	11,228	152,354	25,395	331,831	41.1	475,122	397,185	349,908	234,735
Duluth, Missabe & Northern	Jan.	560	53,179	1,932	71,199	102,085	166,063	2,869	133,750	48,525	453,280	636.6	—382,081	—412,940	—417,762	—392,061
Duluth, Winnipeg & Pacific	Jan.	178	71,627	2,255	76,657	17,035	16,367	1,685	44,223	3,703	83,013	108.3	—6,356	—10,210	—10,656	1,479
Elgin, Joliet & Eastern	Jan.	446	976,232	.....	1,076,801	83,660	220,113	12,991	404,884	61,854	783,502	72.8	293,299	215,890	175,410	—49,381
Erie Railroad	Jan.	2,304	5,117,180	415,939	5,961,726	437,635	1,234,384	165,879	2,344,314	286,473	4,479,521	75.1	1,482,205	1,147,013	885,208	1,094,116

Continued on next left-hand page

Here's one sure way to lower MAINTENANCE COSTS *of cars and locomotives*





Copper-steel pipe lasts longer where atmospheric corrosion is the determining factor. There can be no doubt about that. Numerous tests and extensive installations by leading users the country over have again and again confirmed the fact.

This fact is important to railways. For atmospheric corrosion is a natural enemy of railway equipment, including pipe. Alternate wetting and drying take place constantly, the metal gradually rusts away, the pipe is weakened and must be replaced. Delay and loss of locomotive or car service follows. Increased maintenance cost is the result.

NATIONAL Copper-Steel Pipe resists atmospheric corrosion. It offers a simple, economical, and effective way to minimize replacements and losses incidental thereto, and to lower maintenance costs.

Impressive and convincing records for this product have been established during its twenty years of use. Begin now to get the benefit of this outstanding advantage in pipe for railway service. Specify NATIONAL Copper-Steel Pipe—

The Original Copper-Steel Pipe

Look For The Green Color! National Copper-Steel Pipe is marked as follows: Black Pipe—Smaller sizes colored green. Larger sizes, two green stripes running lengthwise. Galvanized Pipe—All sizes, two green stripes running lengthwise.

NATIONAL TUBE COMPANY · Pittsburgh, Pa.
Pacific Coast Distributors—COLUMBIA STEEL CO., San Francisco, Calif.
Export Distributors—UNITED STATES STEEL PRODUCTS CO., New York, N. Y

United States Steel Corporation Subsidiary

NATIONAL *Copper-Steel* RUST RESISTING PIPE

Revenues and Expenses of Railways

MONTH OF JANUARY OF CALENDAR YEAR 1935—CONTINUED

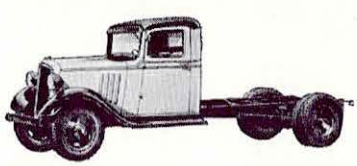
Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of: Way and structures	Equipment	Traffic	Transportation	General	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income	Net ry. operating income, 1934
New Jersey & New York	Jan.	45	$15,623	$51,610	$68,888	$5,198	$25,265	$1,411	$50,612	$2,959	$85,445	124.0	—$16,557	—$20,707	—$37,425	—$37,878
N. Y., Susquehanna & Western	Jan.	215	303,084	25,983	348,235	22,563	59,303	4,845	145,950	12,236	244,897	70.3	103,338	79,774	45,527	42,326
Florida East Coast	Jan.	811	355,058	258,133	726,472	118,347	137,293	24,287	257,876	53,816	609,063	83.8	117,409	42,290	447	181,201
Fort Smith & Western	Jan.	249	63,077	751	67,962	14,960	10,702	5,489	19,854	4,013	55,167	81.2	12,795	10,795	5,528	4,315
Georgia Railroad	Jan.	329	198,495	13,003	232,730	21,817	51,351	16,500	111,209	11,972	213,218	91.6	19,512	14,170	25,303	40,554
Georgia & Florida	Jan.	408	63,681	1,905	69,220	15,705	14,900	7,881	31,551	7,363	77,400	111.8	—8,180	—12,768	—14,777	—8,767
Grand Trunk Western	Jan.	1,006	1,366,077	67,083	1,541,993	149,175	347,828	31,293	674,641	80,686	1,287,138	83.5	254,855	177,800	57,232	—36,652
Canadian Nat'l Lines in New Eng.	Jan.	172	76,745	5,670	91,520	25,690	21,358	2,392	66,543	9,218	125,897	137.5	—34,377	—45,677	—83,119	—85,832
Great Northern	Jan.	8,328	3,627,440	325,061	4,364,571	488,664	928,912	156,817	2,089,385	296,479	4,015,886	92.0	348,685	—206,976	—364,748	—215,834
Green Bay & Western	Jan.	233	103,126	1,374	108,167	18,533	14,699	5,684	50,359	5,756	95,031	87.8	13,136	7,595	7,745	—5,923
Gulf & Ship Island	Jan.	259	59,884	6,827	78,419	14,190	13,031	3,388	49,660	6,377	86,781	110.7	—8,362	—22,455	—30,345	—17,216
Gulf, Mobile & Northern	Jan.	961	382,743	17,157	417,703	56,667	74,240	32,763	151,162	32,330	347,362	83.16	70,341	40,134	—1,231	41,389
Illinois Central	Jan.	4,973	5,533,459	730,353	6,758,492	548,560	1,642,264	224,479	2,766,124	336,100	5,565,810	82.4	1,192,682	758,382	673,203	872,944
Yazoo & Mississippi Valley	Jan.	1,635	726,149	60,239	860,605	82,208	175,856	33,746	422,698	52,759	766,607	89.1	93,998	—22,018	—97,863	10,126
Illinois Central System	Jan.	6,609	6,259,608	790,592	7,619,097	630,768	1,818,120	258,225	3,188,822	388,859	6,332,417	83.1	1,286,680	734,364	584,840	893,070
Illinois Terminal	Jan.	525	312,406	57,696	404,447	37,562	64,933	14,760	158,378	22,874	300,199	74.22	104,248	78,439	61,889	71,039
Kansas City Southern System	Jan.	878	635,645	17,183	740,657	74,068	144,543	49,020	271,751	82,646	624,331	84.3	116,326	46,095	16,397	94,190
Kansas, Oklahoma & Gulf	Jan.	326	163,707	413	166,610	7,388	19,413	6,915	38,209	9,884	81,464	48.9	85,146	72,436	57,973	48,442
Lake Superior & Ishpeming	Jan.	160	33,966	99	35,774	20,728	25,833	651	21,094	7,436	75,742	211.7	—39,968	—53,190	—55,114	—52,128
Lehigh & Hudson River	Jan.	96	128,118	147	132,961	11,120	21,518	3,126	45,280	8,317	89,361	67.2	43,600	31,437	18,766	17,406
Lehigh & New England	Jan.	220	297,089	292	298,964	26,964	56,218	5,697	105,699	20,354	214,931	71.9	84,033	70,646	75,929	86,998
Lehigh Valley	Jan.	1,354	3,116,913	203,708	3,553,242	193,715	630,514	107,047	1,567,801	137,523	2,651,958	74.6	901,284	753,276	604,067	620,802
Louisiana & Arkansas	Jan.	608	295,841	8,497	330,973	43,783	56,651	22,423	89,870	23,091	235,088	71.0	95,885	61,146	52,724	84,936
Louisiana, Arkansas & Texas	Jan.	255	70,000	251	72,713	18,277	8,265	4,611	26,140	5,733	63,026	86.7	9,687	7,167	—5,647	1,417
Louisville & Nashville	Jan.	5,051	5,119,529	505,126	6,116,049	678,925	1,344,235	186,821	2,260,816	278,905	4,792,992	78.4	1,323,057	990,895	1,027,236	1,409,943
Maine Central	Jan.	1,046	734,828	87,346	905,399	209,361	159,431	9,343	423,112	40,057	841,207	92.9	64,192	15,691	—23,490	57,260
Midland Valley	Jan.	361	118,917	11	120,752	9,432	7,305	2,253	31,030	8,069	57,969	48.0	62,783	55,290	43,276	31,471
Minneapolis & St. Louis	Jan.	1,647	476,051	14,869	527,084	63,153	126,069	23,815	320,521	43,192	576,051	109.3	—48,967	—71,021	—96,293	—2,491
Minn., St. Paul & S. S. Marie	Jan.	4,297	1,309,316	69,298	1,507,936	250,084	310,037	56,751	864,479	147,283	1,633,340	108.3	—125,404	—249,734	—333,652	—230,535
Duluth, South Shore & Atlantic	Jan.	556	109,906	9,528	129,969	25,741	31,646	4,811	79,475	9,422	150,936	116.1	—20,967	—31,274	—40,056	—43,081
Spokane International	Jan.	163	24,919	2,931	32,791	7,835	5,819	1,762	20,009	5,532	40,957	124.9	—8,166	—11,070	—12,751	—8,909
Mississippi Central	Jan.	150	46,969	1,723	50,537	7,165	11,689	6,806	17,725	6,904	50,289	99.5	248	—2,534	—4,519	—4,233
Missouri & North Arkansas	Jan.	364	57,925	1,165	65,219	14,743	8,613	3,828	26,065	5,900	59,149	90.7	6,070	4,503	—3,867	1,162
Missouri-Illinois	Jan.	208	77,518	707	79,926	13,761	12,677	2,636	29,066	6,887	65,020	81.4	14,906	9,606	4,031	7,131
Missouri-Kansas-Texas Lines	Jan.	3,293	1,546,541	164,933	1,946,519	268,482	540,295	111,232	808,505	157,492	1,903,495	97.8	43,024	—126,827	—314,237	37,014
Missouri Pacific	Jan.	7,235	4,880,926	335,402	5,734,875	668,743	1,258,192	233,345	2,337,200	380,675	4,904,685	85.5	830,190	502,697	101,009	557,204
Gulf Coast Lines	Jan.	1,763	960,344	31,042	1,052,438	112,699	146,563	42,198	280,721	64,979	647,042	61.48	405,396	357,502	231,874	182,207
International-Great Northern	Jan.	1,154	803,982	55,722	975,723	135,387	172,982	28,405	385,514	63,356	798,901	81.88	176,822	143,020	33,022	55,143
San Antonio, Walde & Gulf	Jan.	316	67,223	3,290	79,075	16,402	10,810	4,521	30,387	6,350	67,965	86.0	11,110	7,470	—14,312	10,531
Mobile & Ohio	Jan.	1,201	541,286	25,050	608,701	87,946	152,402	41,364	280,525	54,936	617,905	101.5	—9,204	—41,956	—96,508	5,481
Monongahela	Jan.	174	323,793	767	327,826	25,214	30,551	438	81,038	6,871	144,112	44.0	183,714	165,629	77,674	94,059
Montour	Jan.	57	130,953	.....	132,295	7,868	30,315	898	35,862	6,388	81,331	61.5	50,964	37,920	58,134	23,324
Nashville, Chattanooga & St. Louis	Jan.	1,191	782,052	118,509	1,034,181	123,668	255,771	64,204	427,101	53,800	930,980	90.0	103,201	67,704	11,871	159,904
Nevada Northern	Jan.	165	18,553	885	23,793	9,203	3,473	672	8,003	4,411	25,762	108.3	—1,969	—8,559	—4,626	—1,208
New York Central	Jan.	11,392	17,651,340	5,054,245	25,506,613	2,388,143	5,175,891	508,024	10,010,342	1,016,310	19,514,730	76.5	5,991,883	3,847,123	2,501,195	2,454,237
Pittsburgh & Lake Erie	Jan.	233	1,098,302	47,938	1,182,816	84,264	361,862	26,227	449,115	66,173	995,128	84.1	187,688	91,149	247,221	182,264
New York, Chicago & St. Louis	Jan.	1,691	2,651,897	67,169	2,813,724	222,170	419,978	103,862	1,033,957	123,725	1,909,920	67.9	903,804	759,936	504,168	518,379
New York, New Haven & Hartford	Jan.	2,068	3,170,291	1,900,156	5,727,979	728,313	870,384	74,865	2,319,471	240,601	4,387,035	76.6	1,340,944	990,321	457,513	724,221
New York Connecting	Jan.	20	218,290	.....	224,701	8,082	6,166	.....	29,590	1,043	44,881	20.0	179,820	146,520	110,106	150,517

Continued on next left-hand page

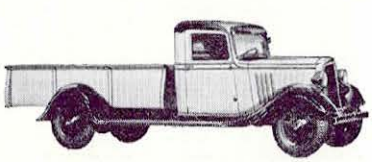
CHEVROLET

Truck owners know economy THAT'S WHY THEY BUY CHEVROLET TRUCKS

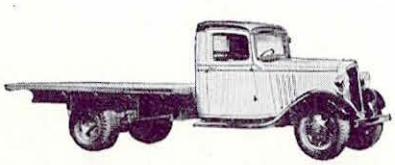
*1½-Ton Stake, $660
(131" Wheelbase)



*1½-Ton Chassis and Cab, $605
(157" Wheelbase)



1½-Ton Open Express, $655
(131" Wheelbase)



*1½-Ton Platform, $630
(131" Wheelbase)

Men who study haulage costs know that Chevrolet trucks are as outstanding in economy and durability as they are in price. Chevrolet trucks handle tough hauling jobs day after day at small operating cost, because they are built to Chevrolet's own high standards of quality in every part. The powerful six-cylinder valve-in-head engines are truck motors, especially designed to give sustained pulling power and to keep on working under the hard punishment of road and load. Features that assure stamina and long life are evident in every detail of the precision-engineered chassis. Chevrolet trucks are the *world's lowest-priced* trucks—because Chevrolet is the *world's largest builder* of trucks.

CHEVROLET MOTOR COMPANY, DETROIT, MICHIGAN

Compare Chevrolet's low delivered prices and easy G.M.A.C. terms. A General Motors Value

*At left and above are list prices of commercial cars at Flint, Michigan. *Dual wheels and tires $20 extra. Special equipment extra. Prices subject to change without notice.*

CHEVROLET TRUCKS

World's Lowest Prices

Revenues and Expenses of Railways

MONTH OF JANUARY OF CALENDAR YEAR 1935—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures	Maintenance of Equipment	Traffic	Transportation	General	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income	Net ry. operating income, 1934
New York, Ontario & Western	Jan.	567	$832,152	$6,979	$890,631	$64,692	$134,764	$9,926	$381,880	$24,658	$621,416	69.8	$269,215	$228,609	$157,318	$169,378
Norfolk & Western	Jan.	2,181	5,454,183	143,675	5,791,756	712,375	1,276,528	121,783	1,490,187	298,896	3,910,549	67.5	1,881,207	1,192,686	1,320,963	1,474,732
Norfolk Southern	Jan.	932	305,840	9,053	333,100	59,049	53,335	21,347	138,851	29,891	302,473	90.8	30,627	4,726	—17,282	5,857
Northern Pacific	Jan.	6,722	2,887,890	259,558	3,529,071	431,718	962,061	136,252	1,811,605	369,520	3,774,625	107.0	—245,554	—682,626	—374,733	129,392
Northwestern Pacific	Jan.	375	105,634	64,328	201,513	36,665	47,469	4,456	141,153	14,174	243,261	120.7	—41,748	—57,055	—63,951	—36,647
Oklahoma City-Ada-Atoka	Jan.	132	34,283	324	37,033	3,778	1,045	657	10,808	1,956	18,244	49.3	18,789	16,146	8,683	999
Pennsylvania Railroad	Jan.	10,470	20,872,514	5,533,701	29,049,287	2,566,525	5,914,232	605,645	11,023,177	1,995,935	22,511,141	77.5	6,538,146	4,940,114	4,248,702	4,808,260
Long Island	Jan.	396	479,769	1,245,790	1,811,256	311,363	340,850	11,593	975,290	90,403	1,729,502	95.5	81,754	—32,383	—193,117	217,392
Pennsylvania-Reading Seashore Lines	Jan.	409	229,321	91,048	338,062	99,391	82,618	6,678	278,894	38,125	506,294	149.8	—168,232	—232,472	—304,835	—184,692
Pere Marquette	Jan.	2,151	2,107,192	64,637	2,268,488	219,820	472,862	60,883	849,000	88,863	1,694,770	74.7	573,718	466,210	316,490	207,912
Pittsburg & Shawmut	Jan.	101	59,976	557	61,394	9,685	19,358	1,462	20,130	5,117	55,752	90.8	5,642	5,057	9,245	15,760
Pittsburgh & West Virginia	Jan.	138	231,999	.....	243,160	18,335	54,352	12,896	52,564	16,500	164,501	67.7	78,659	61,509	80,331	59,158
Pittsburg, Shawmut & Northern	Jan.	190	77,246	175	78,990	12,363	18,851	1,287	32,502	8,800	73,803	93.4	5,187	2,884	—3,849	6,668
Reading	Jan.	1,460	4,067,067	285,466	4,606,693	328,907	879,411	77,743	1,833,671	293,311	3,430,444	74.5	1,176,249	896,908	887,843	1,426,700
Richmond, Fredericksburg & Potomac	Jan.	117	236,577	194,647	528,245	48,342	127,072	7,925	233,745	45,713	475,473	90.0	52,772	28,521	942	47,003
Rutland	Jan.	407	163,025	38,342	251,978	44,646	63,409	10,811	143,845	14,224	276,935	109.9	—24,957	—44,162	—38,235	—29,601
St. Louis-San Francisco	Jan.	5,057	2,512,498	218,857	3,027,509	514,124	800,912	98,727	1,234,508	216,857	2,869,658	94.8	157,851	—79,321	—86,318	408,284
Ft. Worth & Rio Grande	Jan.	233	22,407	1,407	30,290	10,787	9,434	2,909	24,143	5,342	52,601	173.7	—22,311	—26,304	—31,289	—22,719
St. Louis, San Francisco & Texas	Jan.	261	61,942	452	65,563	27,206	15,365	4,378	36,446	8,660	92,055	140.4	—26,492	—30,220	—55,693	—43,812
St. Louis Southwestern Lines	Jan.	1,786	1,175,252	16,299	1,245,563	127,404	189,297	71,383	415,022	59,660	869,371	69.8	376,192	305,317	208,875	83,640
San Diego & Arizona Eastern	Jan.	155	31,106	3,877	36,270	10,345	8,400	2,298	18,239	4,817	44,665	123.1	—8,395	—10,731	—10,214	4,688
Seaboard Air Line	Jan.	4,307	2,170,379	402,555	2,869,910	402,065	596,246	138,623	1,101,988	196,027	2,480,387	86.4	389,523	148,288	51,559	374,940
Southern Ry.	Jan.	6,644	5,290,326	690,208	6,589,007	880,235	1,277,164	148,519	2,602,788	251,026	5,205,891	79.0	1,383,116	928,462	768,097	969,576
Alabama Great Southern	Jan.	315	307,352	41,078	380,847	81,375	101,940	10,903	139,195	14,938	351,101	92.2	29,746	1,822	878	64,834
Cinn., New Orleans & Texas Pacific	Jan.	336	892,102	81,072	1,037,791	164,858	201,784	23,933	281,894	36,670	714,484	68.9	323,307	251,623	234,809	221,437
Georgia Southern & Florida	Jan.	397	90,409	31,871	141,347	27,857	40,960	1,658	69,047	2,542	144,674	102.4	—3,327	—16,117	—7,052	2,659
New Orleans & Northeastern	Jan.	204	138,086	15,086	167,609	28,352	35,579	5,704	63,465	8,568	143,248	85.5	24,361	1,362	—12,486	—9,515
Northern Alabama	Jan.	99	42,129	1,653	45,324	12,242	1,484	1,139	16,087	1,714	32,666	72.1	12,658	8,966	—3,102	10,618
Southern Pacific	Jan.	8,790	6,383,570	1,386,554	8,627,720	905,103	1,674,791	255,419	3,419,940	571,268	7,025,050	81.4	1,602,670	810,612	527,211	124,858
So. Pac. Steamship Lines	Jan.	....	315,985	6,984	335,776	13,250	86,619	15,447	311,843	17,978	445,137	132.6	—109,361	—111,008	—111,140	—111,404
Texas & New Orleans	Jan.	4,444	2,133,722	216,304	2,671,464	367,909	529,854	111,830	999,508	207,318	2,237,792	83.8	433,672	204,326	744	—148,621
Spokane, Portland & Seattle	Jan.	552	286,724	33,998	352,652	24,873	66,141	5,184	138,119	21,712	258,673	73.3	93,979	40,925	29,349	17,247
Tennessee Central	Jan.	286	172,908	6,377	190.601	24,940	28,486	5,497	65,937	13,669	138,351	72.6	52,250	47,376	34,458	36,851
Texas & Pacific	Jan.	1,949	1,404,920	153,624	1,765,429	202,517	324,728	67,867	578,479	136,916	1,329,493	75.3	435,936	334,588	242,109	325,663
Texas Mexican	Jan.	162	128,356	344	139,910	12,225	14,096	3,298	34,968	6,890	71,144	50.8	68,766	64,660	57,008	—2,317
Toledo, Peoria & Western	Jan.	239	112,961	8	114,903	23,641	8,186	13,812	39,848	7,529	93,016	81.0	21,887	18,187	5,890	10,263
Union Pacific	Jan.	3,629	4,030,960	413,124	4,887,064	320,065	1,239,156	118,803	1,785,355	367,232	3,905,376	79.9	981,688	571,286	351,061	790,008
Oregon Short Line	Jan.	2,504	1,502,718	101,351	1,714,899	115,999	307,808	31,187	616,412	121,514	1,210,989	70.6	503,910	281,406	204,517	180,767
Oregon-Wash. R. R. & Nav. Co.	Jan.	2,293	897,289	97,102	1,105,143	126,669	177,926	47,960	502,070	107,607	969,197	87.7	135,946	10,892	—83,190	—108,840
Los Angeles & Salt Lake	Jan.	1,234	1,075,100	131,343	1,304,793	124,014	226,427	48,729	414,071	69,823	914,177	70.1	390,616	275,278	166,913	73,149
St. Joseph & Grand Island	Jan.	258	194,337	1,649	202,185	17,750	22,638	2,436	69,477	14,938	127,595	63.1	74,590	60,326	34,889	80,696
Utah	Jan.	111	115,779	.....	116,461	12,744	24,379	513	27,618	5,853	71,107	61.1	45,354	29,755	21,831	11,264
Virginian	Jan.	619	1,243,666	3,122	1,298,869	90,570	228,612	16,809	235,867	40,996	612,792	47.2	686,077	521,570	568,239	588,851
Wabash	Jan.	2,447	2,820,657	192,213	3,229,136	317,698	573,791	134,623	1,331,490	197,882	2,565,019	79.4	664,117	529,103	186,889	163,901
Ann Arbor	Jan.	293	274,341	2,679	283,766	20,159	58,217	11,216	128,780	16,732	235,113	82.9	48,653	35,132	19,639	7,810
Western Maryland	Jan.	888	1,218,821	7,139	1,265,329	132,418	306,035	36,073	337,243	48,376	864,277	68.3	401,052	341,052	351,520	352,918
Western Pacific	Jan.	1,213	850,092	25,165	914,843	121,709	159,939	53,357	384,877	54,214	796,868	87.1	117,975	51,121	—8,670	38,045
Wheeling & Lake Erie	Jan.	511	1,027,147	1,538	1,080,237	96,094	312,753	29,111	321,517	45,564	805,039	74.5	275,198	189,649	174,075	136,779
Wichita Falls & Southern	Jan.	203	34,700	46	38,591	8,438	6,590	1,780	13,085	4,329	34,222	88.68	4,369	2,116	—1,477	3,761

Table of Operating Statistics of Railways begins on next left-hand page

THIRTY-SEVENTH ANNUAL REPORT OF READING COMPANY
FOR THE YEAR ENDED DECEMBER 31, 1934

PHILADELPHIA, PA., FEBRUARY 28, 1935.

To the Stockholders of Reading Company:

The Board of Directors submits herewith its 37th Annual Report.

INCOME ACCOUNT

For Years Ended December 31, 1934 and 1933

ACCOUNT	1934	1933
RAILWAY OPERATING REVENUES:		
Freight:		
Coal	$27,542,428.15	$24,475,980.01
Merchandise	19,902,031.19	19,400,315.81
Passenger	2,958,625.84	2,782,679.42
Excess baggage	2,036.72	2,205.05
Parlor and chair car	4,755.27	3,863.87
Mail	412,998.97	437,220.57
Express	415,359.18	386,207.76
Other passenger train	102,267.99	93,891.73
Milk	40,162.48	46,458.20
Switching	243,638.07	258,105.29
Special service train	3,357.50	907.00
All other transportation	347,440.86	335,612.17
Incidental and joint facility	1,103,329.04	1,240,605.23
TOTAL RAILWAY OPERATING REVENUES	$53,078,431.26	$49,464,052.11
RAILWAY OPERATING EXPENSES:		
Maintenance of way and structures	$3,844,950.08	$2,980,871.40
Maintenance of equipment	9,548,328.76	8,862,251.27
Traffic	858,038.13	830,107.39
Transportation	19,752,805.80	18,069,845.51
Miscellaneous operations	215,564.83	191,704.92
General expenses	2,669,800.28†	2,217,823.49
Transportation for investment—Cr.	*4,333.57*	*4,076.11*
TOTAL RAILWAY OPERATING EXPENSES	$36,885,154.31	$33,148,527.87
Ratio of operating expenses to operating revenues	69.49	67.02
Net Revenue from Railway Operations	$16,193,276.95	$16,315,524.24
Railway tax accruals	3,603,345.74	2,539,490.67
Uncollectible railway revenues	8,475.88	17,465.10
RAILWAY OPERATING INCOME	$12,581,455.33	$13,758,568.47
OTHER OPERATING INCOME:		
Hire of freight cars—Net	$17,261.15	$412,876.12*
Other equipment rents—Net	149,284.42	189,431.62
Joint facility rents—Net	108,972.03	41,943.98
TOTAL OTHER OPERATING INCOME	$275,517.60	$181,500.52*
NET RAILWAY OPERATING INCOME	$12,856,972.93	$13,577,067.95
NONOPERATING INCOME:		
Miscellaneous rent income	$599,596.52	$541,022.58
Miscellaneous nonoperating physical property	223,626.73	241,596.99
Separately operated properties—Profit	5,089.51	426,044.94
Dividend income	386,599.51	384,406.39
Income from funded securities	958,291.05	916,938.68
Income from unfunded securities and accounts	145,021.29	225,022.40
Income from sinking and other reserve funds	28,077.50	28,482.37
Miscellaneous income	14,000.42	12,199.23
TOTAL NONOPERATING INCOME	$2,360,302.53	$2,775,713.58
GROSS INCOME	$15,217,275.46	$16,352,781.53
DEDUCTIONS FROM GROSS INCOME:		
Rent for leased roads	$3,259,161.00	$3,255,920.04
Miscellaneous rents	137,983.74	137,901.74
Miscellaneous tax accruals	209,447.68	191,305.60
Interest on funded debt	5,502,708.85	5,610,380.24
Interest on unfunded debt	61,310.34	80,613.73
Amortization of discount on funded debt	7,730.44	7,942.43
Miscellaneous income charges	356,879.91	353,195.22
TOTAL DEDUCTIONS FROM GROSS INCOME	$9,535,221.96	$9,637,259.00
NET INCOME	$5,682,053.50	$6,715,522.53
DISPOSITION OF NET INCOME:		
Income applied to sinking and other reserve funds	$44,520.00	$44,813.05
INCOME BALANCE TRANSFERRED TO PROFIT AND LOSS	$5,637,533.50	$6,670,709.48

† Includes $379,058 set aside under the Federal Railroad Retirement Act, from August 1 to December 31, 1934.
Italics denote credits.
* Debit.

GENERAL BALANCE SHEET, DECEMBER 31, 1934

ASSETS

INVESTMENTS:		
Investment in road and equipment		$317,609,174.55
Improvements on leased railway property		46,253,576.95
Deposits in lieu of mortgaged property sold:		
Cash	$1,689.01	
Securities $2,474,823.56		
Less company's securities 1,709,600.00		
	765,223.56	
		766,912.57
Miscellaneous physical property		12,438,653.70
		$377,068,317.77
Investments in Affiliated Companies:		
Stocks		$46,345,706.00
Bonds		12,175,002.06
Advances		11,279,297.85
		$69,800,005.91
Other Investments:		
Stocks		$4,968,175.27
Bonds		4,148,446.62
Advances		491,188.85
Miscellaneous		427,878.27
		$10,035,689.01
Total Investments		$456,904,012.69
CURRENT ASSETS:		
Cash		$4,131,365.50
Special deposits		32,612.60
Loans and bills receivable		118,339.75
Traffic and car-service balances receivable		1,129,314.10
Net balance receivable from agents and conductors		981,136.53
Miscellaneous accounts receivable		1,735,171.41
Material and supplies		5,082,932.90
Interest and dividends receivable		498,970.65
Total Current Assets		$13,709,843.44
DEFERRED ASSETS:		
Working fund advances		$39,812.00
Insurance and other funds $1,049,380.73		
Less company's securities 411,000.00		
		638,380.73
Other deferred assets		237,476.01
Total Deferred Assets		$915,668.74
UNADJUSTED DEBITS:		
Rents and insurance premiums paid in advance		$15,823.67
Discount on funded debt		385,803.01
Other unadjusted debits		534,419.14
Total Unadjusted Debits		$936,045.82
Securities issued or assumed—unpledged $4,602,916.67		
Securities issued or assumed—pledged 1,476,000.00		
Grand Total		$472,465,570.69

LIABILITIES

	Book Liability	Held by or for Company	
STOCK:			
First preferred	$28,000,000.00	$8,800.00	$27,991,200.00
Second preferred	42,000,000.00	29,350.00	41,970,650.00
Common	70,000,000.00	10,900.00	69,989,100.00
Total Stock	$140,000,000.00	$49,050.00	$139,950,950.00
LONG-TERM DEBT:			
Funded debt secured by mortgage	$112,226,048.10	$6,502,466.67	$105,723,581.43
Funded debt secured by stock collateral	24,295,000.00	1,623,000.00	22,672,000.00
Equipment trust obligations	6,050,000.00	25,000.00	6,025,000.00
Total Funded Debt Unmatured	$142,571,048.10	$8,150,466.67	$134,420,581.43
Non-negotiable debt to affiliated companies			320,040.50
Total Long-Term Debt			$134,740,621.93
CURRENT LIABILITIES:			
Traffic and car-service balances payable			$1,344,096.98
Audited accounts and wages payable			3,184,481.94
Miscellaneous accounts payable			967,489.92
Interest matured unpaid			1,737,567.00
Dividends matured unpaid			12,873.15
Funded debt matured unpaid			.....
Unmatured dividends declared			1,119,597.50
Unmatured interest accrued			512,335.88
Unmatured rents accrued			330,144.48
Other current liabilities			23,164.10
Total current Liabilities			$9,231,750.95
DEFERRED LIABILITIES:			
Other deferred liabilities			$210,666.13
UNADJUSTED CREDITS:			
Tax liability			$2,574,624.14
Insurance and casualty reserves			632,848.87
Accrued depreciation—Road			11,519,564.17
Accrued depreciation—Equipment			67,524,168.93
Other unadjusted credits			335,624.85
Total Unadjusted Credits			$82,586,830.96
CORPORATE SURPLUS:			
Additions to property through income and surplus			$103,155,803.13
Funded debt retired through income and surplus			1,738,000.00
Total Appropriated Surplus			$104,893,803.13
Profit and loss credit balance			$850,947.59
Total Corporate Surplus			$105,744,750.72
Grand Total			$472,465,570.69

CHARLES H. EWING, President.

(Advertisement)

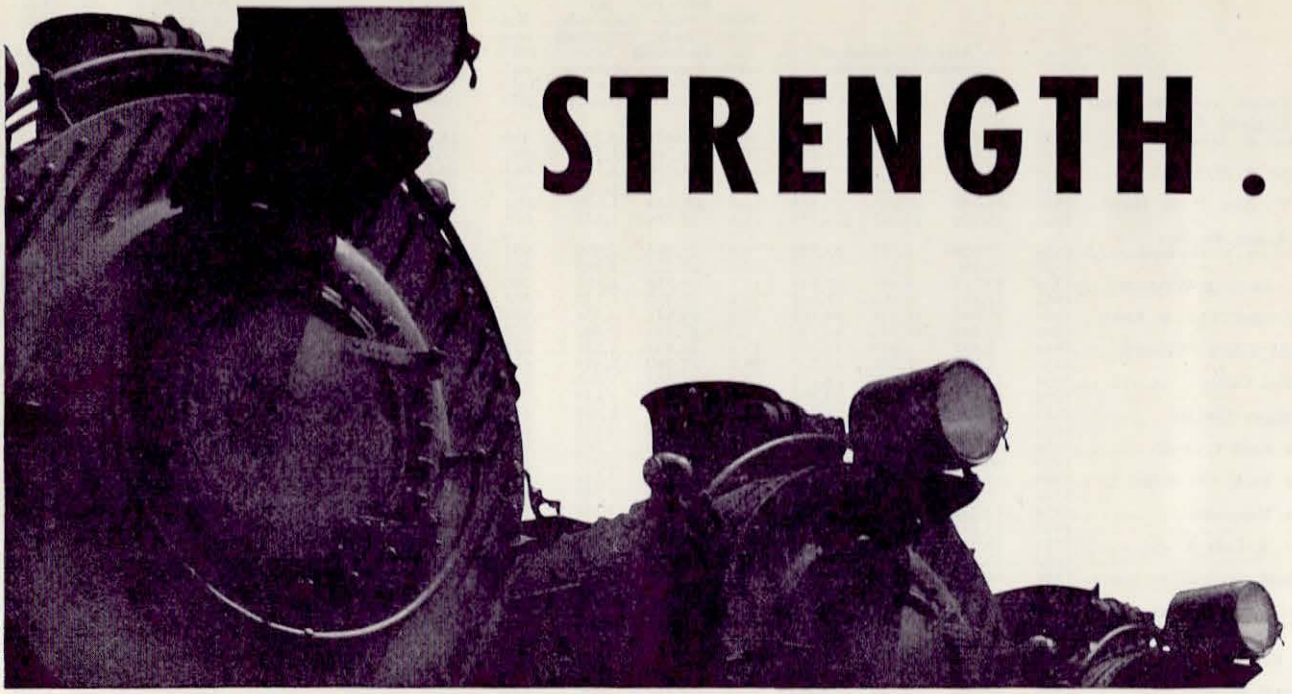
Freight Operating Statistics of Large Steam Railways—Selected Items for the Month of December,

Region, road, and year	Average miles of road operated	Locomotive-miles: Train-miles	Locomotive-miles: Principal and helper	Locomotive-miles: Light	Car-miles: Loaded (thousands)	Car-miles: Per cent loaded	Ton-miles (thousands): Gross Excluding locomotives and tenders	Ton-miles (thousands): Net Revenue and non-revenue	Average number of locomotives on line: Serviceable	Unserviceable	Per cent unserviceable	Stored
New England Region:												
Boston & Albany	1934	402	123,973	128,581	8,833	2,825	65.5	154,095	51,854	53	42	44.3	8
	1933	402	128,995	133,601	8,831	2,881	68.1	150,257	50,393	66	37	36.3	17
Boston & Maine	1934	2,016	256,525	285,044	27,770	8,241	68.8	450,065	170,532	98	184	65.1	3
	1933	2,059	254,679	287,369	26,334	7,833	67.1	434,867	160,929	130	156	54.5	14
N. Y., New H. & Hartf.	1934	2,045	329,270	398,742	19,010	9,852	65.3	546,407	198,240	217	138	38.8	36
	1933	2,044	321,258	391,232	19,360	9,568	65.2	525,157	195,250	199	160	44.6	19
Great Lakes Region:													
Delaware & Hudson	1934	848	206,319	278,586	31,659	6,744	60.5	432,388	196,620	250	27	9.7	157
	1933	848	208,904	278,409	31,503	6,414	59.7	415,445	188,602	246	31	11.2	140
Del., Lack. & Western	1934	992	332,443	371,334	48,886	10,056	64.7	597,293	233,016	185	87	31.9	41
	1933	998	343,111	381,154	48,965	9,892	64.7	593,415	237,830	193	64	25.1	41
Erie (incl. Chi. & Erie)	1934	2,305	607,760	643,223	41,371	24,205	63.5	1,491,249	569,580	322	167	34.1	103
	1933	2,315	602,152	629,174	45,862	23,771	62.8	1,470,189	564,848	324	169	34.3	95
Grand Trunk Western	1934	1,007	194,340	196,712	2,303	4,848	58.8	302,917	102,428	64	75	53.8	..
	1933	1,008	197,096	198,505	2,590	4,470	58.3	278,786	93,036	68	80	54.0	2
Lehigh Valley	1934	1,335	377,368	399,232	38,107	10,683	63.3	681,096	279,896	194	118	37.8	28
	1933	1,335	370,486	387,574	38,541	10,289	62.9	643,738	264,462	171	146	46.1	11
Michigan Central	1934	1,961	384,342	385,473	16,587	11,794	59.9	710,102	230,753	131	55	29.6	24
	1933	1,957	329,890	331,238	13,158	9,674	61.2	576,101	200,951	135	53	28.3	38
New York Central	1934	6,408	1,398,432	1,487,712	112,464	46,693	59.8	3,033,368	1,261,256	553	454	45.1	39
	1933	6,411	1,389,720	1,484,908	107,756	47,298	58.7	3,081,617	1,267,385	566	576	50.4	23
New York, Chi. & St. L.	1934	1,661	454,832	458,390	4,914	13,801	61.2	839,649	304,110	138	42	23.1	38
	1933	1,660	455,881	463,105	4,718	13,100	60.2	797,329	285,996	131	60	31.5	25
Pere Marquette	1934	2,152	314,068	329,423	2,848	7,266	59.2	476,879	184,355	115	43	27.1	10
	1933	2,218	309,557	316,884	2,805	6,630	58.5	437,475	168,030	117	56	32.3	22
Pitts. & Lake Erie	1934	234	57,894	59,972	48	2,185	56.4	179,941	95,207	38	33	45.9	18
	1933	234	62,967	65,282	1,095	2,401	56.3	200,870	108,309	30	40	57.1	4
Wabash	1934	2,435	536,005	545,877	11,018	14,982	61.2	910,973	297,873	163	169	50.9	31
	1933	2,445	498,416	506,405	9,908	13,912	61.2	829,822	270,071	168	171	50.4	71
Central Eastern Region:													
Baltimore & Ohio	1934	6,321	1,229,094	1,476,603	150,780	33,505	59.0	2,328,177	1,018,453	774	541	41.1	208
	1933	6,263	1,201,711	1,464,785	158,915	32,564	58.1	2,283,384	998,066	716	618	46.3	98
Big Four Lines	1934	2,653	571,672	591,670	27,156	15,625	59.8	1,046,076	472,945	194	178	47.8	5
	1933	2,655	548,118	569,368	23,892	15,054	60.3	976,237	428,398	201	160	44.3	25
Central of New Jersey	1934	690	139,510	156,586	30,928	4,546	57.4	327,579	156,341	70	95	57.4	14
	1933	690	137,231	150,730	24,913	4,204	56.6	302,131	143,978	101	71	41.0	39
Chicago & Eastern Ill.	1934	939	172,769	173,814	2,832	3,638	60.5	254,652	113,222	50	59	54.3	6
	1933	939	172,292	173,349	2,938	3,496	59.1	244,274	106,326	63	109	63.4	15
Elgin, Joliet & Eastern	1934	446	80,907	81,906	777	1,694	57.6	136,959	66,619	62	26	29.9	13
	1933	446	77,949	78,589	1,162	1,610	59.4	127,565	63,962	66	23	25.4	16
Long Island	1934	393	30,696	31,666	14,163	290	53.8	22,079	9,169	37	24	39.3	1
	1933	396	28,167	28,749	13,060	266	52.8	20,332	8,118	34	21	38.5	..
Pennsylvania System	1934	9,994	2,368,265	2,648,484	303,317	79,723	60.8	5,400,734	2,381,520	1,405	1,031	42.3	296
	1933	10,082	2,431,468	2,726,887	292,945	79,319	60.9	5,345,548	2,331,183	1,538	906	37.1	413
Reading	1934	1,453	389,245	423,426	48,285	10,728	58.1	804,881	388,539	267	100	27.3	73
	1933	1,454	381,461	416,788	46,181	9,979	57.9	747,283	359,419	257	111	30.2	86
Pocahontas Region:													
[illegible]	1934	3,078	746,963	787,776	31,654	29,158	55.5	2,492,440	1,342,197	435	98	18.3	134
	1933	3,112	723,125	760,317	30,193	27,900	55.4	2,369,624	1,270,380	459	210	31.3	160
Norfolk & Western	1934	2,164	531,018	553,861	25,504	18,989	59.8	1,513,312	800,712	358	37	9.4	139
	1933	2,163	510,505	530,103	23,535	17,410	60.5	1,435,574	762,708	409	56	12.1	195
Southern Region:													
Atlantic Coast Line	1934	5,148	522,888	523,726	7,209	10,012	59.3	551,462	181,418	301	151	33.5	61
	1933	5,145	547,034	547,805	6,093	10,367	59.8	574,453	194,759	353	129	26.7	107
Central of Georgia	1934	1,886	207,085	207,784	3,140	4,129	66.7	232,815	86,136	105	37	25.8	..
	1933	1,886	189,477	190,309	3,534	3,743	66.4	206,770	75,119	103	38	27.1	..
Ill. Cent. (incl. Y. & M. V.)	1934	6,579	1,387,592	1,394,184	26,771	30,245	58.8	2,081,214	867,143	598	331	35.6	8
	1933	6,640	1,236,644	1,251,474	22,451	26,372	57.9	1,808,138	733,623	595	339	36.3	10
Louisville & Nashville	1934	5,049	919,937	984,758	25,771	18,770	59.6	1,320,065	628,411	326	257	44.1	20
	1933	5,102	862,169	919,698	23,538	17,481	58.9	1,223,394	575,677	344	296	46.2	36
Seaboard Air Line	1934	4,295	447,114	456,336	2,909	10,239	61.9	605,258	209,838	184	87	32.1	9
	1933	4,298	447,843	455,213	3,639	10,171	63.5	599,072	214,340	218	73	25.1	12
Southern	1934	6,599	1,037,266	1,051,552	17,659	21,649	62.8	1,262,838	481,926	567	285	33.4	86
	1933	6,602	1,012,592	1,025,427	16,677	21,080	63.9	1,199,606	451,293	665	253	27.6	167
Northwestern Region:													
Chi. & North Western	1934	8,428	829,764	877,865	21,406	20,197	61.9	1,257,491	424,137	562	268	32.2	181
	1933	8,443	863,629	896,831	19,433	19,475	60.9	1,206,345	438,194	578	239	29.3	162
Chicago Great Western	1934	1,456	227,546	228,179	8,808	6,060	56.8	393,725	135,127	64	36	35.8	6
	1933	1,463	202,249	203,749	14,532	5,672	56.6	366,111	123,030	66	33	33.7	3
Chi., Milw., St. P. & Pac.	1934	11,152	1,161,506	1,220,910	58,320	26,821	58.7	1,734,623	680,528	494	266	35.1	128
	1933	11,195	1,040,530	1,092,032	47,434	24,196	60.3	1,540,707	613,492	566	314	35.7	228
Chi., St. P., Minneap. & Om.	1934	1,644	200,789	208,534	10,259	3,892	60.7	247,252	97,748	113	45	28.5	54
	1933	1,653	196,577	201,399	9,350	3,759	65.7	230,825	91,802	123	33	21.3	61
Great Northern	1934	8,302	652,256	657,806	22,011	18,657	64.9	1,135,220	453,381	427	175	29.0	85
	1933	8,333	586,046	590,841	18,812	15,274	67.1	940,909	401,382	437	166	27.6	115
Minneap., St. P. & S. St. M.	1934	4,274	337,733	342,500	2,087	6,500	62.6	371,864	144,239	110	45	28.9	..
	1933	4,281	316,160	319,768	2,139	5,800	65.2	335,202	137,108	123	41	25.2	12
Northern Pacific	1934	6,408	532,235	580,627	39,114	15,124	67.3	882,566	365,865	345	102	22.7	23
	1933	6,414	490,699	529,996	35,078	13,288	67.7	794,321	343,205	365	153	29.6	32
Oreg.-Wash. R. R. & Nav.	1934	2,125	158,418	164,616	9,496	3,476	68.9	203,965	80,810	92	36	28.5	27
	1933	2,130	139,465	144,259	9,580	3,351	66.9	200,614	82,963	74	46	38.7	15
Central Western Region:													
Alton	1934	921	169,956	172,710	1,470	3,407	57.5	224,812	82,292	47	42	47.0	3
	1933	923	168,567	171,411	897	3,010	59.4	195,276	68,613	36	55	60.0	1
Atch., Top. & S. Fe (incl. P. & S. F.)	1934	11,391	1,303,160	1,367,230	51,177	33,311	62.2	2,012,678	648,068	562	315	35.9	139
	1933	11,509	1,217,151	1,271,981	48,304	29,335	61.5	1,809,522	596,301	624	297	32.3	206
Chi., Burl. & Quincy	1934	8,951	1,156,138	1,213,982	40,542	27,240	60.3	1,674,744	702,898	463	103	18.2	7
	1933	9,093	1,071,823	1,102,058	33,103	25,042	60.7	1,550,960	663,751	431	120	21.8	7
Chi., Rock I. & Pac. (incl. Chi., Rock I. & Gulf)	1934	8,298	978,495	997,070	6,139	19,520	59.6	1,206,585	433,144	380	268	41.3	92
	1933	8,333	937,178	948,311	4,552	18,767	59.1	1,168,827	418,718	447	151	25.2	111
Denver & R. G. Wn.	1934	2,635	230,819	254,287	28,739	6,169	64.2	368,048	147,808	172	45	20.7	13
	1933	2,471	205,361	228,164	27,560	5,677	61.0	354,101	138,911	188	44	19.0	35
Los Angeles & Salt Lake	1934	1,225	162,381	182,734	26,586	4,483	60.2	266,121	92,989	76	22	22.3	8
	1933	1,232	157,206	174,834	20,857	4,102	60.3	243,191	86,333	65	35	35.2	3
Oregon Short Line	1934	2,471	261,645	273,029	18,647	6,802	63.2	421,677	160,801	131	48	27.1	35
	1933	2,464	261,515	270,678	16,813	6,282	60.4	399,132	150,750	144	47	24.7	27
Southern Pacific-Pacific Lines	1934	8,589	997,205	1,073,535	103,310	31,910	63.4	1,927,123	636,566	527	296	35.9	188
	1933	8,802	940,938	1,001,205	97,333	27,854	61.0	1,729,770	554,959	499	384	43.5	163
Union Pacific	1934	3,768	944,405	964,057	39,774	28,197	61.1	1,725,872	576,215	302	108	26.3	64
	1933	3,768	790,124	807,907	35,252	26,167	62.2	1,580,958	549,876	317	112	26.1	109
Southwestern Region:													
Gulf, Colo. & S. Fe	1934	1,906	173,903	175,150	2,221	3,962	64.8	240,886	93,907	88	38	30.3	24
	1933	1,916	177,027	179,170	2,604	4,058	62.8	255,471	101,138	90	34	27.4	25
Mo.-Kans.-Texas Lines	1934	3,282	336,078	338,523	5,165	7,830	60.9	479,855	168,010	112	83	42.5	32
	1933	3,282	358,800	361,159	5,006	8,586	57.9	540,004	189,541	159	73	31.6	73
Missouri Pacific	1934	7,208	1,044,869	1,073,034	26,409	25,436	61.1	1,648,722	633,112	397	160	28.6	132
	1933	7,333	1,015,356	1,032,737	21,977	24,880	60.7	1,590,569	601,744	404	159	28.3	145
St. Louis-San Francisco	1934	5,035	595,645	600,345	7,874	11,724	61.0	725,614	280,144	378	85	18.4	141
	1933	5,173	589,070	593,162	5,946	12,006	60.2	748,782	288,586	399	85	17.6	157
St. Louis Southwestern Lines	1934	1,798	203,693	208,525	2,629	4,708	63.5	271,907	92,823	92	30	24.3	13
	1933	1,872	203,926	209,260	2,779	4,349	59.5	263,972	85,518	94	41	30.1	15
Texas & New Orleans	1934	4,431	468,945	469,294	4,205	9,857	64.6	580,103	210,411	245	54	17.9	69
	1933	4,465	472,908	473,091	4,731	9,260	58.6	578,625	191,908	217	92	29.7	43
Texas & Pacific	1934	1,945	250,360	250,360	2,041	6,759	61.2	419,198	139,221	151	76	33.4	79
	1933	1,946	228,202	228,202	1,120	6,367	59.3	399,126	133,768	167	70	29.6	88

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

1934, Compared with December, 1933, for Roads with Annual Operating Revenues Above $25,000,000

Region, road, and year	Average number of freight cars on line: Home	Foreign	Total	Per cent unserviceable	Gross ton-miles per train-hour, excluding locomotives and tenders	Gross ton-miles per train-mile, excluding locomotives and tenders	Net ton-miles per train-mile	Net ton-miles per loaded car-mile	Net ton-miles per car-day	Car-miles per car-day	Net ton-miles per mile of road per day	Pounds of coal per 1,000 gross ton-miles, including locomotives and tenders	Locomotive-miles per locomotive-day
New England Region:													
Boston & Albany 1934	2,949	3,623	6,572	25.7	20,684	1,243	418	18.4	255	21.2	4,164	178	46.5
1933	3,440	3,381	6,821	27.7	19,714	1,165	391	17.5	238	20.0	4,046	181	44.4
Boston & Maine 1934	8,632	6,376	15,008	14.8	24,140	1,754	665	20.7	367	25.8	2,729	119	35.8
1933	9,101	7,071	16,172	16.3	23,978	1,708	632	20.5	321	23.3	2,522	125	35.3
N. Y., New H. & Hartf. 1934	16,180	10,293	26,473	13.6	24,330	1,659	602	20.1	242	18.4	3,127	119	37.9
1933	15,976	10,217	26,193	11.4	23,584	1,635	608	20.4	240	18.1	3,081	126	36.9
Great Lakes Region:													
Delaware & Hudson 1934	10,969	2,753	13,722	4.5	28,283	2,096	953	29.2	462	26.2	7,477	118	36.1
1933	11,330	2,522	13,852	3.6	25,125	1,989	903	29.4	439	25.0	7,172	129	36.1
Del., Lack. & Western 1934	16,701	4,444	21,145	11.7	29,210	1,797	701	23.2	355	23.7	7,578	161	49.8
1933	17,451	4,480	21,931	12.2	25,060	1,730	693	24.0	350	22.5	7,686	169	53.9
Erie (incl. Chi. & Erie) 1934	26,945	11,218	38,163	7.1	39,941	2,454	937	23.5	481	32.2	7,971	110	45.2
1933	32,985	11,785	44,770	5.2	37,989	2,442	938	23.8	407	27.3	7,870	111	44.2
Grand Trunk Western 1934	5,497	6,813	12,310	15.4	28,464	1,559	527	21.1	268	21.6	3,282	113	46.2
1933	6,231	7,306	13,537	19.9	27,180	1,414	472	20.8	222	18.3	2,976	108	44.0
Lehigh Valley 1934	17,723	5,390	23,113	26.3	31,884	1,805	742	26.2	391	23.5	6,761	153	45.2
1933	18,101	5,782	23,883	19.7	30,326	1,738	714	25.7	357	22.1	6,391	152	43.4
Michigan Central 1934	18,773	19,478	38,251	14.2	33,287	1,848	600	19.6	195	16.6	3,796	120	69.8
1933	21,516	17,682	39,198	10.4	32,345	1,746	609	20.8	165	13.0	3,312	126	59.3
New York Central 1934	53,595	54,307	107,902	23.3	34,700	2,169	902	27.0	377	23.3	6,349	113	51.3
1933	66,026	56,820	122,846	24.4	34,899	2,217	912	26.8	333	21.2	6,377	112	45.0
New York, Chi. & St. L. 1934	9,211	6,336	15,547	4.8	33,327	1,846	669	22.0	631	46.8	5,907	106	83.1
1933	9,299	6,277	15,576	4.8	30,665	1,749	627	21.8	592	45.0	5,557	112	78.9
Pere Marquette 1934	12,223	4,920	17,143	3.3	25,564	1,518	587	25.4	347	23.1	2,764	108	67.8
1933	13,784	4,706	18,490	2.8	24,238	1,413	543	25.3	293	19.8	2,444	105	59.7
Pitts. & Lake Erie 1934	16,914	9,280	26,194	49.9	42,762	3,108	1,645	43.6	117	4.8	13,143	116	27.2
1933	15,480	10,462	25,942	30.0	43,282	3,190	1,720	45.1	135	5.3	14,951	118	30.5
Wabash 1934	14,497	8,082	22,579	3.0	34,484	1,700	556	19.9	426	35.0	3,947	128	54.2
1933	15,547	8,086	23,633	3.1	33,974	1,665	542	19.4	369	31.0	3,563	127	49.1
Central Eastern Region:													
Baltimore & Ohio 1934	78,793	16,430	95,223	19.3	24,906	1,894	829	30.4	345	19.2	5,198	164	39.9
1933	84,250	16,832	101,082	20.2	24,469	1,900	831	30.7	319	17.9	5,141	169	39.3
Big Four Lines 1934	14,567	22,613	37,180	14.7	31,041	1,830	827	30.3	410	22.7	5,750	127	53.7
1933	18,173	21,977	40,150	15.3	31,131	1,781	782	28.5	344	20.1	5,206	126	53.0
Central of New Jersey 1934	14,542	8,150	22,692	30.7	28,775	2,348	1,121	34.4	222	11.3	7,330	149	36.8
1933	16,691	6,653	23,344	34.7	26,429	2,202	1,049	34.2	199	10.3	6,732	150	32.9
Chicago & Eastern Ill. 1934	3,984	2,502	6,486	10.5	25,709	1,474	655	31.1	563	29.9	3,890	135	52.4
1933	5,848	2,408	8,256	22.5	25,074	1,418	617	30.4	415	23.1	3,653	133	33.2
Elgin, Joliet & Eastern 1934	8,740	2,691	11,431	18.6	15,463	1,693	823	39.3	188	8.3	4,817	138	30.3
1933	9,502	3,821	13,323	19.0	14,629	1,657	821	39.7	155	6.6	4,626	139	28.9
Long Island 1934	777	3,194	3,971	3.9	5,819	719	299	31.6	74	4.4	753	334	24.4
1933	781	3,067	3,848	2.1	5,543	722	288	30.5	68	4.2	661	316	24.3
Pennsylvania System 1934	241,838	42,161	283,999	13.7	31,797	2,280	1,006	29.9	271	14.9	7,687	135	39.1
1933	243,866	44,612	288,478	12.2	31,230	2,198	959	29.4	261	14.6	7,459	140	39.9
Reading 1934	33,603	8,568	42,171	8.1	26,368	2,068	998	36.2	297	14.1	8,626	161	41.4
1933	37,002	8,141	45,143	18.9	24,152	1,959	942	36.0	257	12.3	7,977	163	40.6
Pocahontas Region:													
Chesapeake & Ohio 1934	42,934	7,251	50,185	1.8	46,394	3,337	1,797	46.0	863	33.8	14,068	88	49.6
1933	45,813	7,655	53,468	1.7	45,350	3,277	1,757	45.5	766	30.4	13,169	89	38.1
Norfolk & Western 1934	37,576	3,640	41,216	2.8	42,853	2,850	1,508	42.2	627	24.8	11,936	123	47.4
1933	41,122	3,586	44,708	3.4	42,862	2,812	1,494	43.8	550	20.8	11,376	122	38.4
Southern Region:													
Atlantic Coast Line 1934	26,677	6,403	33,080	15.7	18,443	1,055	347	18.1	177	16.5	1,137	130	37.9
1933	27,400	5,562	32,962	25.5	18,552	1,050	356	18.8	191	17.0	1,221	128	37.1
Central of Georgia 1934	7,092	1,964	9,056	27.1	21,050	1,124	416	20.9	307	22.0	1,474	139	47.9
1933	7,608	1,895	9,503	26.0	19,968	1,091	396	20.1	255	19.1	1,285	135	44.4
Ill. Cent. (incl. Y. & M. V.) 1934	51,237	13,700	64,937	40.6	25,234	1,500	625	28.7	431	25.5	4,252	150	49.4
1933	53,326	12,375	65,701	37.6	24,452	1,462	593	27.8	360	22.3	3,564	151	44.0
Louisville & Nashville 1934	47,475	6,414	53,889	33.6	22,690	1,435	683	33.5	376	18.8	4,015	158	55.9
1933	49,563	6,149	55,712	27.5	22,036	1,419	668	32.9	333	17.2	3,640	151	47.6
Seaboard Air Line 1934	12,236	5,091	17,327	6.1	22,308	1,354	469	20.5	391	30.8	1,576	130	54.6
1933	13,123	4,383	17,506	9.3	22,210	1,338	479	21.1	395	29.5	1,609	126	50.9
Southern 1934	28,105	13,198	41,303	14.3	20,196	1,217	465	22.3	376	26.9	2,356	164	40.5
1933	32,358	17,956	50,314	23.8	19,947	1,185	446	21.4	289	21.1	2,205	162	36.6
Northwestern Region:													
Chi. & North Western 1934	44,131	19,239	63,370	13.4	22,497	1,515	511	21.0	216	16.6	1,623	149	35.0
1933	44,482	17,384	61,866	9.8	22,121	1,397	507	22.5	228	16.7	1,674	144	36.2
Chicago Great Western 1934	2,932	2,938	5,870	3.1	31,132	1,730	594	22.3	743	58.6	2,994	150	76.5
1933	3,337	2,840	6,177	6.1	32,888	1,810	608	21.7	643	52.4	2,712	151	70.9
Chi., Milw., St. P. & Pac. 1934	54,145	14,752	68,897	3.3	23,349	1,493	586	25.4	319	21.4	1,968	140	54.3
1933	59,405	13,430	72,835	4.2	23,399	1,481	590	25.4	272	17.8	1,768	137	41.8
Chi., St. P., Minneap. & Om. 1934	2,031	6,818	8,849	10.6	17,148	1,231	487	25.1	356	23.4	1,918	144	44.8
1933	2,330	6,922	9,252	11.3	18,077	1,174	467	24.4	320	19.9	1,792	132	43.5
Great Northern 1934	42,492	10,488	52,980	5.8	26,323	1,740	695	24.3	276	17.5	1,762	144	36.4
1933	43,601	9,881	53,482	6.0	23,837	1,606	685	26.3	242	13.7	1,554	150	32.6
Minneap., St. P. & S. St. M. 1934	14,660	3,137	17,797	5.9	17,278	1,101	427	22.2	262	18.9	1,089	132	71.7
1933	16,698	2,958	19,656	5.3	17,213	1,060	434	23.6	225	14.6	1,033	130	63.3
Northern Pacific 1934	34,840	4,542	39,382	10.1	25,192	1,658	687	24.2	300	18.4	1,842	178	44.8
1933	41,733	4,290	46,023	11.5	23,783	1,619	699	25.8	241	13.8	1,726	165	35.2
Oreg.-Wash. R. R. & Nav. 1934	7,062	1,703	8,765	7.8	21,659	1,288	510	23.2	297	18.6	1,227	166	43.9
1933	8,064	1,767	9,831	9.2	21,504	1,438	595	24.8	272	16.4	1,256	153	41.3
Central Western Region:													
Alton 1934	3,235	6,028	9,263	26.9	29,663	1,323	484	24.2	287	20.6	2,881	138	63.1
1933	3,169	5,333	8,502	22.0	24,694	1,158	407	22.8	260	19.2	2,399	139	61.1
Atch., Top. & S. Fe (incl. P. & S. F.) 1934	67,110	8,380	75,490	13.3	29,353	1,544	497	19.5	277	22.9	1,835	122	52.2
1933	66,441	7,891	74,332	13.1	28,146	1,487	490	20.3	259	20.7	1,671	122	46.2
Chi., Burl. & Quincy 1934	34,448	12,028	46,476	8.1	25,974	1,449	608	25.8	488	31.4	2,533	140	71.5
1933	40,368	11,858	52,226	8.4	25,427	1,447	619	26.5	410	25.5	2,355	133	66.5
Chi., Rock I. & Pac. (incl. Chi., Rock I. & Gulf) 1934	30,466	10,425	40,891	21.5	21,223	1,233	443	22.2	342	25.9	1,684	158	50.0
1933	36,507	9,523	46,030	22.3	22,039	1,247	447	22.3	293	22.3	1,621	155	51.4
Denver & R. G. Wn. 1934	12,865	3,193	16,058	5.9	23,446	1,595	640	24.0	297	19.3	1,810	184	42.0
1933	13,581	3,013	16,594	5.5	24,515	1,724	676	24.5	270	18.1	1,813	175	35.6
Los Angeles & Salt Lake 1934	4,678	1,189	5,867	8.9	29,451	1,639	573	20.7	511	40.9	2,448	154	68.8
1933	4,724	965	5,689	12.1	26,842	1,547	549	21.0	490	38.6	2,261	150	63.3
Oregon Short Line 1934	9,018	4,641	13,659	21.0	27,391	1,612	615	23.6	380	25.4	2,099	131	52.5
1933	9,167	4,107	13,274	19.2	26,171	1,526	576	24.0	366	25.3	1,974	131	48.6
Southern Pacific-Pacific Lines 1934	35,786	21,337	57,123	10.2	31,532	1,933	638	19.9	359	28.4	2,391	112	46.1
1933	38,901	21,643	60,544	13.3	29,246	1,838	590	19.9	296	24.3	2,034	115	40.1
Union Pacific 1934	24,298	8,702	33,000	16.4	43,081	1,827	610	20.4	563	45.1	4,933	126	79.1
1933	25,170	7,835	33,005	19.5	44,141	2,001	696	21.0	537	41.1	4,708	120	63.4
Southwestern Region:													
Gulf, Colo. & S. Fe 1934	10,666	1,685	12,351	7.5	23,187	1,385	540	23.7	245	16.0	1,589	126	45.2
1933	14,054	2,024	16,078	6.9	25,284	1,443	571	24.9	203	13.0	1,703	115	47.1
Mo.-Kans.-Texas Lines 1934	5,946	2,998	8,944	3.5	26,343	1,428	500	21.5	606	46.4	1,651	100	57.0
1933	9,361	2,880	12,241	8.5	27,386	1,505	528	22.1	499	39.1	1,863	97	51.0
Missouri Pacific 1934	20,330	17,625	37,955	4.0	28,403	1,578	606	24.9	538	35.4	2,833	140	63.7
1933	23,088	15,232	38,320	7.5	28,276	1,567	593	24.2	507	34.5	2,647	135	60.4
St. Louis-San Francisco 1934	22,820	4,106	26,926	7.7	22,284	1,218	470	23.9	336	23.0	1,795	149	42.4
1933	23,465	4,253	27,718	6.8	22,121	1,271	490	24.0	336	23.2	1,799	143	40.0
St. Louis Southwestern Lines 1934	3,617	2,553	6,170	7.8	25,177	1,335	456	19.7	485	38.8	1,665	112	56.1
1933	4,648	2,464	7,112	9.3	23,813	1,294	419	19.7	388	33.2	1,474	109	50.9
Texas & New Orleans 1934	8,142	10,466	18,608	7.0	21,214	1,237	449	21.3	365	26.4	1,532	103	51.2
1933	8,779	10,497	19,276	5.7	20,803	1,224	406	20.7	321	26.4	1,386	101	49.9
Texas & Pacific 1934	3,693	4,217	7,910	4.8	25,961	1,674	556	20.6	568	45.1	2,308	97	35.8
1933	3,617	4,850	8,467	6.0	25,840	1,749	586	21.0	510	40.9	2,218	89	31.3



STRENGTH . .

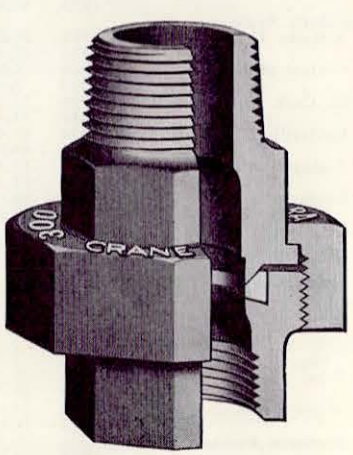
to meet the punishment of strain, vibration and expansion

Railroads demand *stamina.* It's built into these Crane union fittings . . . *unbelievable* strength!

Continuous vibration in locomotives calls for a fitting that can "take it"—stand up under repeated assembly strains—meet relentless hammering. Withstand expansion and contraction . . . twin foes to tight joints.

Make your selection from this *complete* line of dependable railroad unions. All have interchangeable parts. All comply with A. R. A. specifications. Save stock room space, reduce inventory, eliminate confusion.

All A. R. A. unions and union fittings can be furnished with forged steel male tailpieces.



CRANE UNIONS have a durable, tight, non-corroding ground iron to brass seat, forced into a retaining groove under tons of pressure . . . are generously proportioned to meet every strain!

CRANE

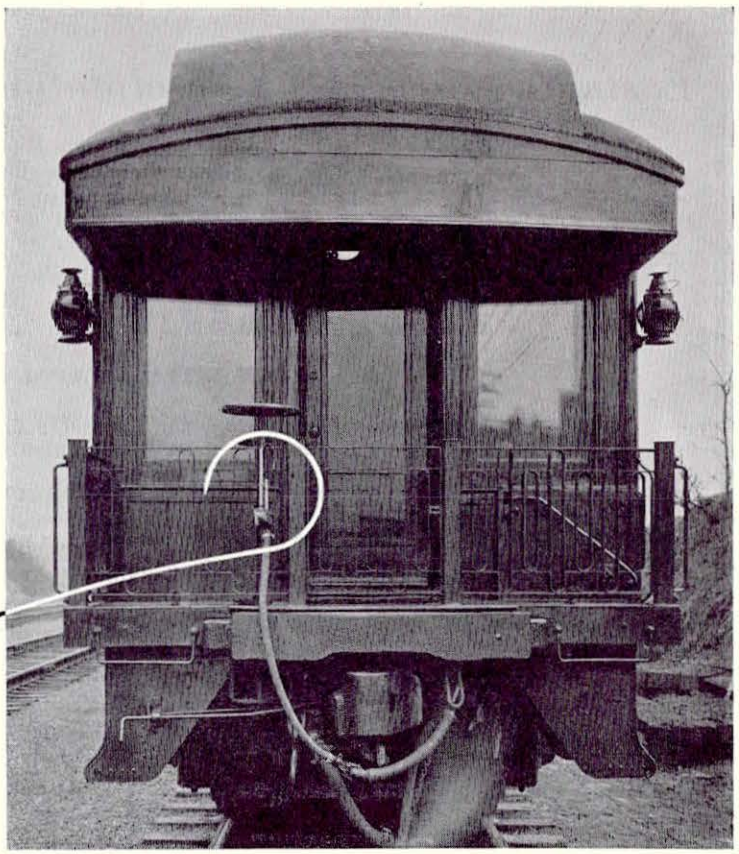
CRANE CO., GENERAL OFFICES: 836 S. MICHIGAN AVE., CHICAGO, ILLINOIS • NEW YORK: 23 W. 44TH STREET

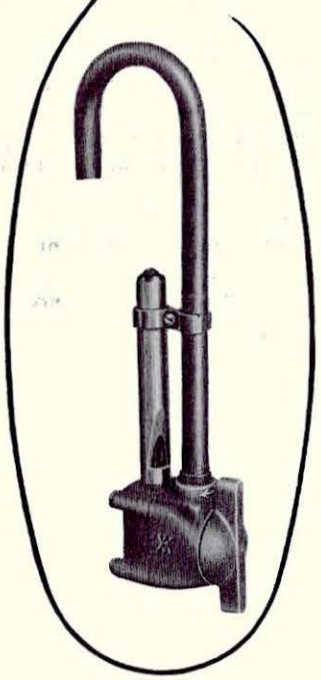
Branches and Sales Offices in One Hundred and Sixty Cities

VALVES, FITTINGS, FABRICATED PIPE, PUMPS, HEATING AND PLUMBING MATERIAL

The New Back-Up Valve and Whistle

gives rear-end pilot of a train complete control of back-up movements.





THE valve is easy to operate, and responds readily to intended brake applications of any desired degree, under all atmospheric conditions — far superior to an ordinary cut out cock, often used for the purpose.

The whistle has a pleasing tone of ample carrying capacity, does not interfere with brake control, and consumes little air.

The composite device is light, easily handled, and, by means of the hooked discharge tube, can be hung over the vestibule railing, bringing the brake control handle convenient to the operator's right hand and the whistle button close to the left. . . . Its simple and sturdy construction assures that maintenance will be easy and inexpensive.

WESTINGHOUSE AIR BRAKE CO.

GENERAL OFFICE *and* WORKS

WILMERDING, PA.

(1281)

Eastman Advocates Consolidation

Federal Co-ordinator of Transportation Joseph B. Eastman, in his recent legislative report, advocated large scale consolidations of railroads along regional lines. Legislation providing governmental authority to compel unification is being sought.

RAILROAD MERGERS

By JOHN WILL CHAPMAN, B.S., M.C.S.

Member of Investment Staff, United States Trust Company of New York; Formerly Statistical and Security Analyst for Standard Statistics Company

THIS timely new book deals with the causes, methods of effecting and results of railroad mergers. It is packed with facts of value to anyone concerned in any way with changes to be effected through the contemplated mergers of American railroads into large competing systems.

WHAT REVIEWERS SAY

"It weighs the respective merits of the more recent type of regional consolidations and the older end-to-end type, and it attempts to gather, sift, and summarize in an orderly way the more important discussions of rail merger problems."—*Barron's.*

"A close student of the railroads, Mr. Chapman has assembled in this timely book a great deal of general statistical information, conveniently arranged, on the evolution of consolidations and unifications into the giant trunk lines of today."—*New York Daily Investment News.*

"The merger problem now confronting us is discussed in some detail with the probable benefits to be derived from the various proposals advanced by the Interstate Commerce Commission, and several others."—*The American Banker.*

"The author weighs the evidence on operating advantages and disadvantages, delves into the financial aspects, and explains the effect of mergers on the market action of railroad securities."—*Wall Street Journal.*

"The whole volume, including the appendices, forms a compact and convenient reference for those seeking data upon this live and disturbing transportation and financial problem—mergers." Professor G. Lloyd Wilson, University of Pennsylvania, in the *Annals of the American Academy of Political and Social Science.*

Some of the Features

Historical Survey—advantages and disadvantages of mergers before 1920.

Merger Problems Under the Transportation Act. Maintenance of competition—Maintenance of existing routes and channels of trade—Valuation of properties—Exact provisions of the Act concerning consolidations—Relation between consolidations and unifications—Exact provisions of Act concerning unifications—Amendments in 1933.

Special Problems. Holding companies—Short lines—Minority stockholders.

Progress of Mergers after Transportation Act. The record from 1920 through 1934—Proposed particular mergers—The I. C. C. Plan—The Four-System Plan of the Eastern trunk-lines.—Current proposals.

Operating and Financial Problems of Future Mergers. Operating advantages and disadvantages—Financial aspects—Effect of mergers on the market action of railroad securities.

Conclusion. Procedural and legislative problems of future mergers—Summary of the Prince-Barriger plan for railroad mergers.

Appendices and Bibliography.

170 pages, 28 merger maps, 6 x 9, cloth, $3.00

ON APPROVAL ORDER COUPON

Simmons-Boardman Publishing Company,
30 Church Street, New York, N. Y.

Send me for Ten Days' Free Examination a copy of Chapman's RAILROAD MERGERS. I will either return the book or remit the list price of $3.00 within that time.

Name .....

Address .....

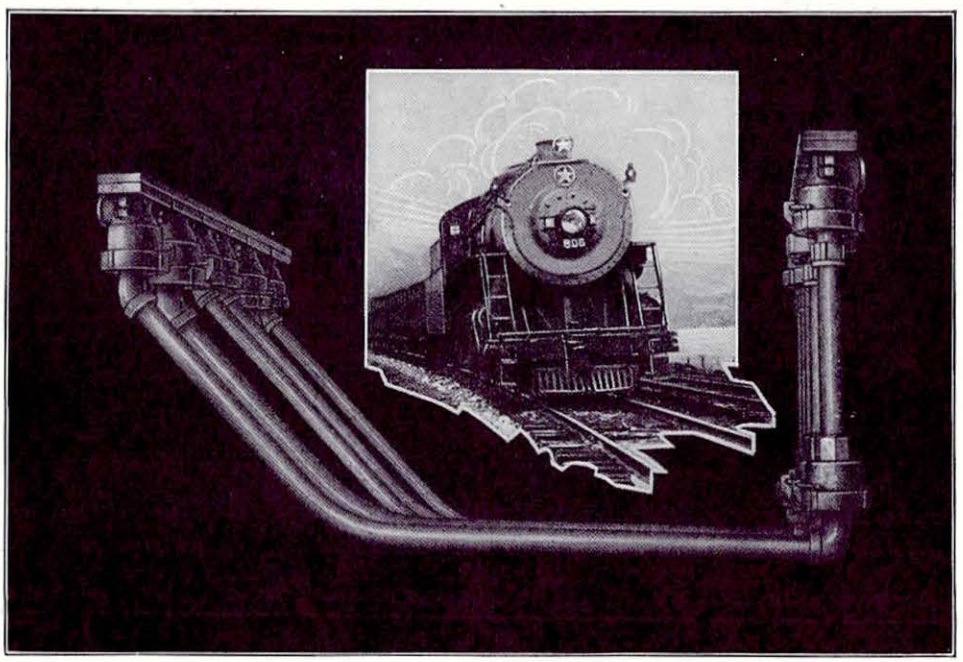
City ..... State.....

Company ..... Position.....

(This offer is limited to retail purchasers in the United States and Canada) R. A. 3-9-35

BARCO

3V Type Engine Tender Connections
for Steam, Air, Oil and Water



Are in use on most of the leading railroads in the United States, Canada and Mexico. They provide the most reliable service at the lowest cost for many definite reasons.

They are bolted direct to the engine and tender, requiring no manifold.

All joints are hung in a vertical position, eliminating side wear on the wearing parts.

They are not supported by male threaded ends.

They provide full capacity with a minimum number of 90° bends, greatly reducing friction losses.

All metal wearing parts are hardened steel forgings.

Number of parts greatly reduced, making less parts to inspect, repair or carry in stock.

Barco steam connections on locomotives, tenders and cars will deliver more steam at the rear of the train.

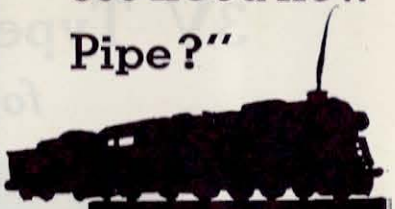
Barco Manufacturing Co.
1801 Winnemac Avenue, Chicago, Illinois
THE HOLDEN CO., LTD.
In Canada
Montreal—Moncton—Toronto
In Canada
Winnipeg—Vancouver

KERITE

in three-quarters of a century of *continuous production.* has spun out a record of performance that is *unequalled* in the history of insulated wires and cables

THE KERITE INSULATED WIRE & CABLE COMPANY INC
NEW YORK CHICAGO SAN FRANCISCO

"Doesn't old 568 need new Pipe?"



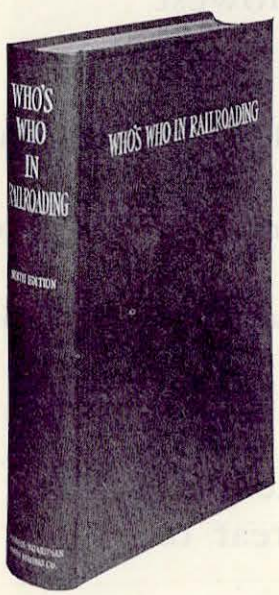
"No—she has Reading Genuine Puddled Wrought Iron Pipe and it's still good as new."

For sound advice on pipe problems, write

READING IRON COMPANY
PHILADELPHIA

SCIENCE AND INVENTION HAVE NEVER FOUND A SATISFACTORY SUBSTITUTE FOR GENUINE PUDDLED WROUGHT IRON

Who's Who in Railroading



THE descriptions of these leaders of the rail industry include personal information such as their family connections and social, religious and political affiliations as well as a complete outline of their professional careers. Since 1885 this book has been recognized as the standard authority in the transportation field. It is regarded as standard equipment in railroad offices and in business and reference libraries.

579 pages, 6 x 9 x 1⅝ inches. $3.00

Book Department

SIMMONS-BOARDMAN PUBLISHING CO.
30 Church Street, New York

Bound Volumes of Old Railroad Magazines

"Railway and Engineering Review"

January-December, 1888, 1897, 1899, 1900, 1901, January-June and July-December, 1906. January-December, 1907, 1908, 1909. January-June and July-December, 1910. July-December, 1911; January-June and July-December, 1912 and 1913.

12 x 14 x 4 inches for the six months volumes, weight about 15 pounds. $4.00 for the six months volumes; $7.00 for annuals, postpaid.

"Railway Age Gazette"

July-December, 1910 and 1911. January-July and July-December volumes from 1912 to 1918 inclusive.

"Railway Review"

July-December, 1916; January-June and July-December, 1917; July-December, 1918; January-June and July-December from 1919 to 1922 inclusive.

"Railway Age"

July-December, 1918; January-June and July-December from 1919 to 1929 inclusive.

9 x 12 x 3 inches, weight about 5 pounds, buckram binding, $4.00, postpaid.

BOOK DEPARTMENT

SIMMONS-BOARDMAN PUBLISHING CO.
30 Church Street **New York**

VAPOR Products

STEAM COUPLERS ARA Standard

VAPOR SYSTEM Thermostatic Control

FLEXIBLE CONDUITS In place of Steam Hose

CONTROLS for Air Conditioning

VAPOR CAR HEATING CO., Inc.
RAILWAY EXCHANGE, CHICAGO

"TIGER" BRONZE
ENGINE CASTINGS

STRONG TOUGH

ANTI-FRICTIONAL EASILY MACHINED

NATIONAL BEARING METALS CORP.
ST. LOUIS, MO.

New York, N. Y. Jersey City, N. J. | Pittsburgh, Pa. Meadville, Pa. | Portsmouth, Va. St. Paul, Minn.

3

Pittsburgh Spring & Steel Co.
1417 Farmers Bank Building, Pittsburgh, Pa.

Makers of Elliptic and Spiral SPRINGS of Every Description

Carbon, Vanadium, Silico-Manganese Steels.
Licensed manufacturers under patents for "Coil-Elliptic" groupings.

Washington, D. C. 824 Union Trust Bldg. | New York 3723 Grand Central Terminal | Chicago 1405 Fisher Bldg.

GET TOGETHER DEPARTMENT

EDUCATIONAL

THE Railway Educational Bureau, Omaha, Neb., offers a distinctive education service for Supervisors and other employes Write for FREE Special Bulletin.

FOR SALE

Why apply *NEW* cast steel Truck Side Frames to *OLD* Cars?

BUY GOOD USED FRAMES

Save 50%! *Two* Sets for *One!*

Iron & Steel Products, Inc.
Frank Parker, Pres.
Railway Exchange, Chicago
"SERVICE-Tested" Car Parts

Your classified advertisement should appear in this section

POSITION OPEN

SALARIED POSITIONS $2,500 to $25,000—This thoroughly organized advertising service of 25 years' recognized standing and reputation carries on preliminary negotiations for positions of the caliber indicated, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate, and each individual must finance the moderate cost of his own campaign. Retaining fee protected by a refund provision as stipulated in our agreement. Identity is covered and, if employed, present position protected. If you have actually earned over $2,500, send only name and address for details.

R. W. BIXBY, Inc.
102 Delward Bldg., Buffalo, N. Y.

MAGNUS COMPANY

(INCORPORATED)

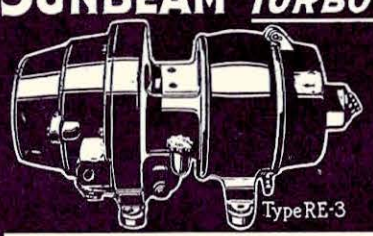
Journal Bearings

AND

Bronze Engine Castings

New York Chicago

SUNBEAM TURBO-GENERATORS



FOR SERVICE, SAFETY, ECONOMY

RANGING in size from 500 to 4000 watts. Sunbeam Turbo Generators have demonstrated their uniform dependability in every country of the world where locomotives are in use Easily accessible for adjustments, they keep labor costs low and their sturdy construction makes large repair part stocks unnecessary Backed by almost half a century of locomotive lighting experience, they combine three locomotive equipment essentials—service safety and economy

SUNBEAM ELECTRIC MFG. CO.
NEW YORK SAN FRANCISCO PHILADELPHIA EVANSVILLE, INDIANA, U. S. A. DENVER RICHMOND INDIANAPOLIS

THE BUCKEYE STEEL CASTINGS CO.
COLUMBUS, OHIO

MANUFACTURER of Side Frames and Bolsters for 4-Wheel and 6-Wheel Freight Cars and Locomotive Tenders, A. R. A. Couplers, Yokes and Car Castings.

EDGEWATER STEEL COMPANY
PITTSBURGH, PA.

Details of our products appeared in the following issues of *Railway Age* during 1933, 1934, 1935:

1933—Feb. 4, 25—March 4—April 1—May 6—June 3, 24—July 1, 22—Sept. 2—Oct. 7, 28—Nov. 4—Dec. 2.
1934—Jan. 6, 27—Feb. 17—March 3—April 7, 21—May 5, 19—June 2, 9, 16, 30—October 13—November 3—Dec. 1.
1935—January 5, 26—Feb. 2, 16.

Index to Advertisers

March 9, 1935

A

American Arch Co., Inc. 13
American Bridge Company 8
American Locomotive Co. 15
American Sheet & Tin Plate Co. 6, 8
American Steel Foundries 5
American Steel & Wire Co. 6, 8

B

Baldwin Locomotive Works, The 4
Barco Mfg. Co. 21
Bethlehem Steel Company 3
Bixby, Inc., R. W. 23
Buckeye Steel Castings Corp. 23

C

Carnegie Steel Co. 6, 8
Chevrolet Motor Company 17
Classified Advertisements 23
Columbia Steel Co. 6, 8
Crane Company 18
Cyclone Fence Company 8

E

Edgewater Steel Company 23

F

Franklin Railway Supply Co., Inc. 12

G

General Railway Signal Co. 26
General Steel Castings Corp. 2
Get Together Department 23

H

Harbison-Walker Refractories Co. 13
Hunt-Spiller Manufacturing Corp. 25

I

Illinois Steel Company 6, 7, 8
Iron & Steel Products, Inc. 23

K

Kerite Insulated Wire & Cable Co., Inc., The 22

L

Lima Locomotive Works, Inc. 11
Lorain Steel Co., The 8

M

Magnus Company, Inc. 23

N

National Bearing Metals Corp. 23
National Tube Company 6, 8, 16

P

Pittsburgh Spring & Steel Co. 23
Professional Directory 23

R

Rail Joint Company, The ..... Front Cover
Railway Educational Bureau 23
Reading Iron Company 22
Republic Steel Corporation 10

S

Scully Steel Products Co. 8
Simmons-Boardman Publishing Co. 20, 22
Sunbeam Electric Mfg. Co. 23
Superheater Company, The 14

T

Tennessee Coal, Iron & Railroad Co. 6, 8

U

Union Switch & Signal Co. 26
U. S. Steel Corp. Subsidiaries 6, 7, 8, 16
Universal Atlas Cement Co. 8

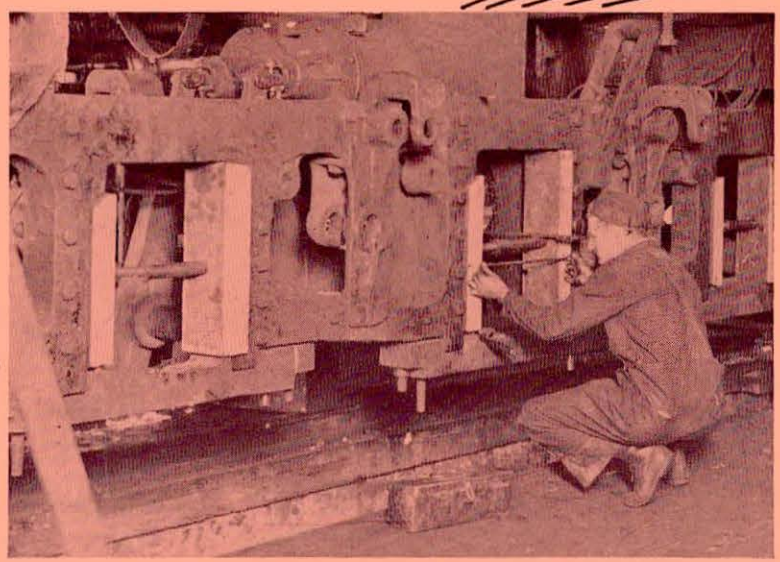
V

Vapor Car Heating Co. 23

W

Westinghouse Air Brake Co. 19

100% APPLICATIONS Insure Maximum Economies



Shoes and Wedges

EVERY railroad executive interested in the cost of locomotive maintenance will be interested in the economies which can be effected by the use of HUNT-SPILLER *Air Furnace* GUN IRON Shoes and Wedges.

Their wear-resisting qualities insure long service life, less frequent wedge adjustments and increased mileage from many locomotive parts by the prevention of destructive driving box pounds.

Railroads searching for maximum economies should equip all of their locomotives with all the HSGI parts listed at the bottom of this page.

HSGI
Reg. U. S. Trade Mark

Cylinder Bushings
Cylinder Packing Rings
Pistons or Piston Bull Rings
Valve Bushings
Valve Packing Rings
Valve Bull Rings
Crosshead Shoes
Hub Liners
Shoes and Wedges
Floating Rod Bushings

Parts Finished For Application

Dunbar Sectional Type Packing
Duplex Sectional Type Packing for Cylinders and Valves (Duplex Springs for Above Sectional Packing)
Cylinder Snap Rings
Valve Rings All Shapes

HUNT-SPILLER MFG. CORPORATION
J. G. Platt, Pres. & Gen. Mgr. V. W. Ellet, Vice-President.

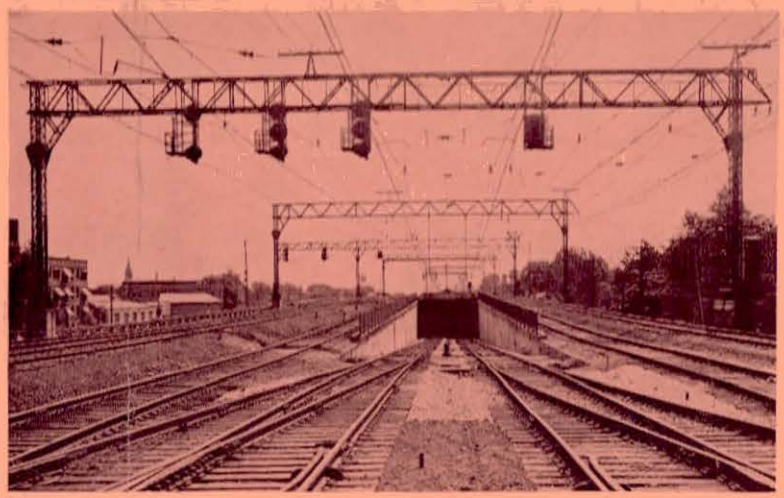
Office & Works
383 Dorchester Ave. South Boston, 27, Mass.
Canadian Representative: Joseph Robb & Co., Ltd., 70 North Bank Rd., Montreal, P. Q.
Export Agent for Latin America:
International Rwy. Supply Co., 30 Church Street, New York, N. Y.

HUNT-SPILLER GUN IRON

Air Furnace

The annual meeting of the Signal Section of the Association of American Railroads will be held at the Hotel Stevens, Chicago, March 11, 12.

The annual meeting of the American Railway Engineering Association will be held at the Palmer House, Chicago, March 12, 13, 14.



Illinois Central Electrification, Chicago, Illinois

SIGNAL MODERNIZATION

The Signal Section Committee on Economics of Railway Signaling will present among other reports, the following:

Yard and Terminal Train Movements Expedited by Signaling

Importance of modern signaling in efficiency of operation in terminal territory and reduction in time of trains in transit because of the elimination of delays at originating, intermediate, or final yards and terminals.

Signal Protection for Light Traffic Railroads Crossing at Grade

Increasing necessity for eliminating train stops at unprotected grade crossings; desire for increased freight train tonnage and increased speed between terminals; and necessity for reducing maintenance and transportation expenses, providing more economical and efficient train service, and increasing the safety of operation have brought about many simplified installations.

Train Operation — Single Track Versus Double Track

Removing 5.87 miles of track on a 6.40 mile double track section has resulted in a net credit of $24,713.

Economics of Changing from Automatic Train Control to Automatic Cab Signals

Four railroads which have changed from A.T.C. to A.C.S. report annual returns on the expenditures varying from 37.8 to 258.4 per cent.

The A.R.E.A. Committee on Signals and Interlocking report will include:

Developments in Railway Signaling

Automatic train control and locomotive cab signals, automatic interlocking, dual control selectors for switches, facing point locks for spring switches, remote control, centralized traffic control, car retarders, etc.

UNION SWITCH & SIGNAL COMPANY
Swissvale, Pennsylvania

GENERAL RAILWAY SIGNAL COMPANY
Rochester, N. Y.

121

HISTORY IN THE MAKING

The March meetings will be the 41st annual meeting of the Signal Section and the 36th annual meeting of the American Railway Engineering Association.